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A Teacher's Guide to *BASIC LIFE SCIENCE:*

Listen to the Prairie and *Stream Stories*

ACCESS NETWORK

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A Teacher's Guide to

BASIC LIFE SCIENCE:
Listen to the Prairie and *Stream Stories*

Research for this **Guide** was done by David Spalding, and the activities were designed by Pauline Urquhart. The artwork is by Ray Fowler.

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If you are an Alberta educator and would like information on ordering these and other ACCESS NETWORK Radio CKUA AM•FM materials, please contact the Supervisor of the Centre at the following address:

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The order numbers and program titles of the series are:

BASIC LIFE SCIENCE: Listen to the Prairie

BPN AU1-4748-01	The Buffalo
-02	The Prairie Rattlesnake
-03	The Pronghorn Antelope
-04	The Burrowing Owl
-05	The Horned Lark
-06	The Prickly Pear and Pincushion Cacti
-07	The Scorpion
-08	The Sage Grouse
-09	The Horned Lizard
-10	The Cottontail Rabbit
-11	The Red-Tailed Hawk
-12	The Grasshopper
-13	The Black Widow Spider

BASIC LIFE SCIENCE: Stream Stories

-14	The Beaver
-15	The Dipper
-16	The Leech
-17	The Sturgeon
-18	The Common Loon
-19	The Dragonfly
-20	The Trumpeter Swan
-21	The Rainbow Trout
-22	The Common Goldeneye
-23	The Leopard Frog
-24	The Killdeer
-25	The Otter
-26	The Osprey

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Introduction

BASIC LIFE SCIENCE is a series of twenty-six audio programs, developed by ACCESS NETWORK Radio CKUA AM•FM in co-operation with the Department of Education, for use with the Grades 4 - 6 Science curriculum, and also in the broader context of environmental studies. The first set of thirteen programs, entitled *Listen to the Prairie,* examines several forms of wildlife that are typical of the prairie habitat of southeastern Alberta. The second set, called *Stream Stories,* explores particular freshwater species of wildlife located in mountain streams and in northern lakes and rivers. Together, these two sets of fifteen-minute programs present a diversity of mammals, birds, reptiles, fish, and invertebrates.

The **Teacher's Guide** to *BASIC LIFE SCIENCE* provides an overview of each audio program and suggests some pre- and post-listening activities for classroom use. Many of the activities are inquiry-based and involve fieldwork. If you are located near a ravine, park, vacant lot or farm area, fieldwork will probably not be difficult to arrange. Even if your school is situated in the very core of an urban area, it is still possible to conduct inquiry-based science programs by focusing on forms of wildlife that have adapted to life within a town or city. (Some possibilities include the house sparrow, starling, American robin, snowshoe hare.) This **Guide** also provides some simple plans for "wildlife enclosures" (e.g., an oversized pickle jar can be developed into a comfortable home for small types of wildlife).

Many schools offer outdoor-education programs. You may be able to co-ordinate science activities to coincide with an existing outdoor-activity program. Another alternative to consider is that of bringing wildlife into the classroom. Terrariums and aquariums provide endless possibilities for class study. Further, some wildlife agencies are willing to visit schools and bring with them a variety of resource materials, including live animals, films, and pictures. (For other resource materials, refer to the list of publications on page 51, or to the *Environmental Education Resource* catalogue, an Alberta Education publication.)

Various activities in this publication suggest school visits by professionals involved in wildlife occupations. If there are no specialists in your area, the telephone can bring their expertise into the classroom. Many schools have telephones equipped with a built-in intercom for conference calls. Prepare a list of questions with your students, then arrange to use the speaker phone to conduct an interview with your "guest." The conference call can open a world of fascinating information to your students.

* * *

Radio permits the listener to develop a unique intimacy with a topic or subject. In keeping with this factor, *BASIC LIFE SCIENCE* makes great use of storytelling techniques designed to engage a child's imagination and stimulate further inquiry. Sound effects, interviews, poetry, and music are blended to add color and texture to the study of school science. Information is provided at a level suitable for Division II students. Technical terms have been avoided unless essential to an understanding of the subject matter, in which case they are presented in bold-face type. Statistics have been kept to a minimum. However, where appropriate, they have been presented in metric units and are always related in size and number to objects familiar to a child. Where issues examined are controversial, several points of view have been presented.

To enrich the learning experience, the theme of each tape should be introduced prior to listening and the class directed to listen specifically for certain information. In the process of developing students' listening skills, you will also be enhancing their knowledge in the science area.

The Buffalo

In this program, students are introduced to the prairie habitat through one of its long-time inhabitants, the buffalo. The history of the buffalo is traced from its original population density of millions, through virtual **extinction**, to its current protected status.

Pre-listening questions and activities

1. Display pictures of extinct species (the dinosaur, the dodo bird, the passenger pigeon, the Great Awk, etc.).
2. Discuss reasons why a species becomes extinct.
3. Have students listen to the audiotape to discover why so few buffalo exist today.

Post-listening questions and activities

1. What problems would arise if we were to reintroduce the buffalo to the prairie in great numbers?
2. Do you think we should try to protect the buffalo from disappearing? Why or why not?
3. The main reason for the drastic decline of the buffalo population was uncontrolled hunting by persons other than the Native peoples.

   a) Ask students to research and describe three methods used to kill the buffalo.

   b) Discuss the purpose of hunting laws.

4. "Animal conservation" and "animal management" are terms with a wide scope. To acquaint students with some of the people involved in these matters, help them to conduct library research on such professionals as, for example, zoologists, naturalists, ornithologists, fisheries and forestry graduates, etc. Consider arranging school visits, or phone interviews, with people in these occupations.

The Prairie Rattlesnake

Alberta's only poisonous snake lives in the near desert landscape of the Badlands. The program examines some of the rattlesnake's specialized **adaptations** such as its heat-sensing organ, as well as the general characteristics of reptiles.

Pre-listening questions and activities

1. Discussion of the concept of adaptation would be a helpful pre-listening activity.

   How have human beings learned to survive when the temperature drops below freezing? How do we adapt our bodies to underwater exploration?

   How have polar bears and fish adapted to their environment?

   Whales and porpoises live in the water, but breathe air. (They do not possess gills.) How have they adjusted to such conditions?

2. The effect of a rattlesnake bite can be fatal. Should we exterminate animals that are considered dangerous? Why or why not?

3. Direct students to listen for the following information:

   a) the rattlesnake's preferred habitat

   b) how the rattlesnake has adapted to its environment

   c) how the rattlesnake can both harm and help human beings.

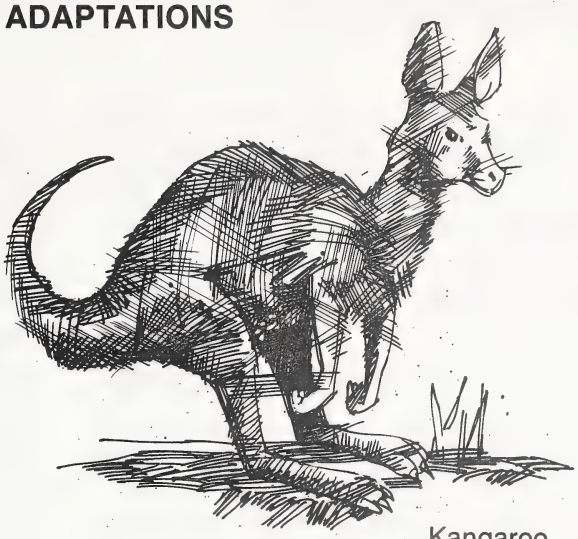
Post-listening questions and activities

1. Assist students in compiling a list of characteristics of reptiles and then defining these characteristics. Ask them to identify the special ways in which reptiles have adapted to various environments in Alberta.

2. After discussing the rattlesnake's special adaptations, provide students with pictures of such particular animal adaptations as the webbed foot of a frog, a seed-eating bird's beak, an anteater's nose. Discuss why the adaptation in question is helpful to the animal. (See the illustrations on page 3.)

ANIMAL ADAPTATIONS

Flying squirrel
(gliding)



Kangaroo
(leaping)

Toucan
(seizing and crushing)

Seal
(swimming)

Anteater
(nosing into anthills)

Frog's foot
(ease of
movement
in water)

The Pronghorn Antelope

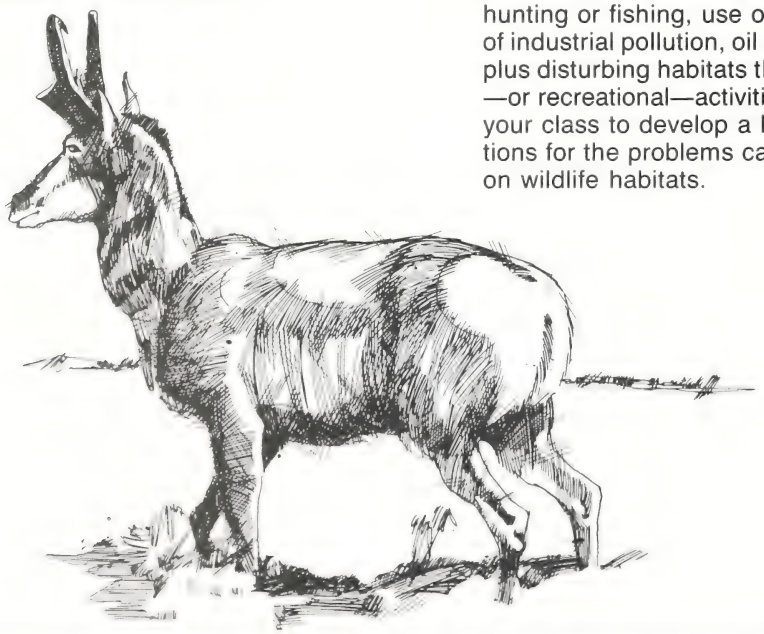
PROGRAM THREE

The pronghorn antelope is found only in North America. In this program, the animal's special adaptations are discussed in relation to its Alberta habitat. Like the buffalo, the pronghorn once faced extinction but, due to careful management, its population has steadily increased.

The program also provides insight into how animal species are named.

Pre-listening questions and activities

1. Find a picture of an unusual animal, one not likely to be known to your students. Ask them to give the species a name, and to justify their choice.
2. Help students to compile a list of horned wild animals that live in Alberta (elk, caribou, deer, moose, wapiti, etc.). Identify the animal's special adaptations (horns for protection, long legs for speed, agility, etc.).
3. Direct students to listen for the following information:
   a) the special adaptations developed by this antelope
   b) how the pronghorn acquired its name
   c) what this animal eats and drinks.



Post-listening questions and activities

1. Why is fire both harmful and helpful to animals?
2. Ask students to create and draw a new species of animal. Encourage them to name their animal, using the techniques outlined in the audiotape.
3. ENDANGERED WILDLIFE WATCH

   Help students to make a list of the many forms of wildlife that are threatened, endangered, or are now extinct.

   a) Find pictures, or ask students to draw pictures, of animals that are endangered, or have become extinct. Create an "Awareness Corner" in your classroom where these pictures and newspaper or magazine articles on the topic can be displayed.

   b) Invite a member of Alberta Fish and Wildlife to your class to discuss ways that government legislation is helping to preserve fauna and flora. A park warden could also add an interesting perspective on conservation. Such specialists can reinforce the need and purpose for laws regarding wildlife.

   c) Make a wall chart that shows some of the activities that threaten wildlife (uncontrolled hunting or fishing, use of pesticides, effects of industrial pollution, oil exploration, mining, plus disturbing habitats through construction —or recreational—activities). Brainstorm with your class to develop a list of possible solutions for the problems caused by our impact on wildlife habitats.

The Burrowing Owl

The burrowing owl has an acute sense of hearing to help it hunt in semi-darkness. Its unusual adaptations include an ability to turn the head almost all the way around, and an ability to simulate the sound of a rattlesnake.

Pre-listening questions and activities

1. Ask students to name creatures whose homes are underground, and to suggest the advantages of having a subterranean home.
2. Explain that many creatures are **nocturnal** or **semi-nocturnal**. Ask the class to speculate about special adaptations required by a nocturnal animal (e.g., the ability to see in the dark, a detection system such as a bat's that allows it to sense obstacles and prey).

Post-listening questions and activities

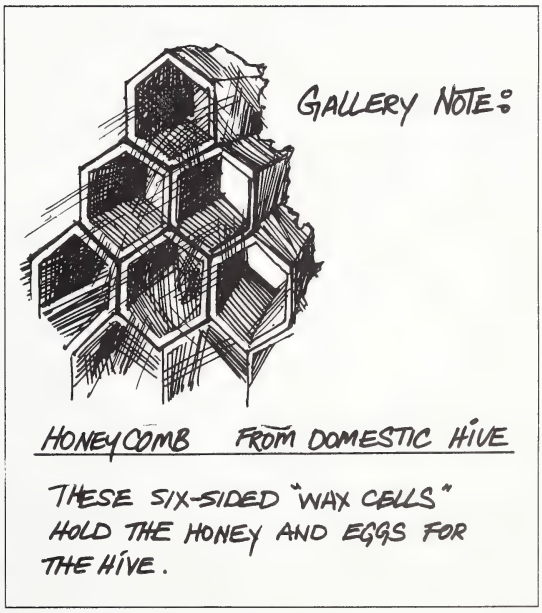
1. As a creative writing assignment, ask students to imagine what life would be like if their family suddenly decided to move underground. How might their eating habits, clothing, appearance, and activities change?
2. Have the class conduct library research in order to discover the types of owls that live in Alberta. Then, with student help, make a chart showing the characteristics common to all owls, and those special features particular to any one type of owl.

3. WILDLIFE SCAVENGER HUNT
(gathering, organizing, classifying)

The following activity, which encourages students to be alert to signs of wildlife, is probably easier if the school is located in a rural area, or near a park. However, since this can be an ongoing activity, students can take advantage of family outings to acquire the items in question. And, some students may have their own collections of "wildlife souvenirs" to draw on.

Prepare a list of wildlife items for a classroom natural-history museum. Items could include: owl pellets, abandoned nests, feathers, pieces of fur, fish scales, shells, bones and teeth, a piece of a honeycomb, a log chewed by a beaver, etc.

As "curators" of the "museum," students could prepare gallery notes for each item, as illustrated below.



You might consider collecting examples of flora. Leaves and flowers can be dried and pressed by placing them between the pages of a book. Specimens can then be mounted on a stock card, or in a scrapbook, and coated with a plastic spray to preserve them.

The Horned Lark

This songster is one of the many prairie birds whose plumage is dull brown, a color that aids protection from **predators**. The program introduces some of the natural factors that help control the population of horned larks, and suggests ways in which humankind interferes with the lark's habitat.

Pre-listening questions and activities

1. Discuss the term "camouflage" and provide students with pictures of military camouflage, as well as examples from nature.
2. Introduce the terms "predator" and "prey." Make a list of predator-prey relationships.

Post-listening questions and activities

1. Through the use of pictures, follow the development of a bird from embyro to chick. If possible, set up an incubator in the classroom. (Many high school science classes have this equipment. You may be able to borrow an incubator and eggs, or arrange to visit such a classroom.)
2. People often tend to classify birds as either pests or creatures useful to humans. Discuss the shortcomings of this method of wildlife classification.
3. Larks have inspired many poems and songs. Obtain some for your students to enjoy.
4. Discuss whether or not human beings are any creature's prey.

   Ask students to suppose that another creature begins to hunt humans and describe how we might have to adapt to this circumstance. (Defence strategies would vary according to the type of creature the students envision as predator.)
4. How is the lark harmful to us? How is it helpful?

The Prickly Pear & Pincushion Cacti

PROGRAM SIX

Cactus plants have specialized roots that dig deep to find desert water. These plants have stems that perform the functions of leaves, usually large, showy flowers, and berry-like fruit. The Native peoples used cactus spines to cure rheumatism, but cacti were considered a curse by early settlers in Alberta.

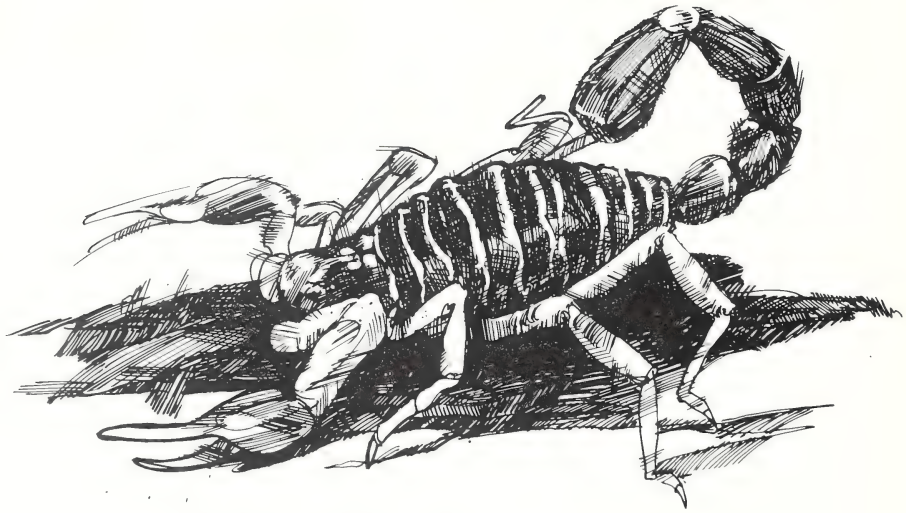
Pre-listening questions and activities

1. Have a general class discussion about cacti.
   - How many students have cacti as house plants?
   - How does the care of a cactus differ from that of other house plants?
2. Like animals, plants, too, have made special adaptations. Ask students to listen to the tape and identify the cacti's special features.

Post-listening questions and activities

1. Alberta's cacti are small. Find pictures of larger varieties, or visit a conservatory in your area.
2. Cut open a cactus or other succulent plant to demonstrate the way in which these plants store water. (You may wish to mention the camel in order to draw a parallel between the plant and animal worlds.)
3. How do animals find ways to eat spiny plants?

The Scorpion



Fossil remains demonstrate that scorpions existed at least 550 million years ago. This eight-legged arthropod possesses a number of fascinating adaptations, including an external skeleton, a set of claws, and a sting at the tip of its tail to assist in defence and in immobilizing prey.

Pre-listening questions and activities

1. Find a picture of a medieval knight and discuss what is meant by the term "segmented." How did knights adjust their armor? (See the illustration on page 9.)

   Suggest other creatures that make use of armor plate.

2. A dictionary exercise would help students to understand arthropods. After they have looked up the meaning of the term (Gk. *arthron* + Gk. *pous, podos* foot), ask them to speculate about which creatures belong to this **phylum** or division of the animal kingdom.

Post-listening questions and activities

1. Start a discussion about scientists as follows.

   • What do scientists do?

   • How many different kinds of scientists can you name?

   • Why are scientists important?

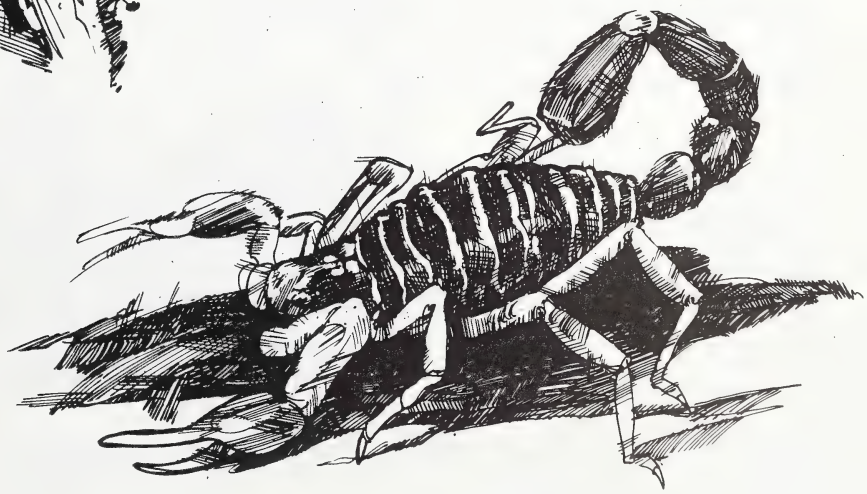
   • How do scientists acquire knowledge?

   Explain that many scientists begin their search by identifying a question. Then divide half the class into groups of four or five. Ask each group to form a question about the scorpion, or other topics related to the audio program. Arrange for the students in the other half of the class to conduct library research to find the answer to the questions, then report back to the class. If some of them were unable to find the answer to their question, have a class discussion to suggest other ways of finding answers (asking an expert, phoning a large municipal library, conducting an experiment, etc.).

2. Locate pictures of different types of scorpions. Describe the habitat of each variety and ask students to suggest reasons for differences in color, size, etc. Why, for example, would the African variety mentioned in the tape be so much larger than the Alberta variety? Why are some scorpions poisonous while others are not?

A knight's armor was tailor-made. The leather strapping that held the various parts in place could be tightened or loosened as required.

As a scorpion grows, it sheds its exoskeleton from time to time in a process called molting. A new exoskeleton then appears in liquid form and hardens into place.



The Sage Grouse

PROGRAM EIGHT

In this program, students are introduced to the mating behavior of the sage grouse, the largest grouse in North America. Males attract mates through an intricate dance. The term "lek" refers to the dancing ground where males gather.

Pre-listening questions and activities

1. Bring into class a sample of sage for students to touch and smell.
2. Obtain a film that shows the sage grouse's mating dance. Discuss how other species attract mates. Deer and seals, for example, fight for mates; males of certain other species use *display* techniques, e.g., fanning out brightly colored plumage.
3. Have students listen to the audiotape in order to discover how the family life of a sage grouse is different from the human experience.

Post-listening questions and activities

1. The grouse depends heavily upon the sage plant for its diet. What would happen if this bush suddenly disappeared? Does it necessarily follow that the grouse will disappear?
2. Ask students to look through magazines to find examples of camouflage. Create a classroom display of this special technique, e.g.,

   insects: walking stick, peppered moth

   fish: pipefish, filefish

   animals: arctic fox, mink

   birds: snowy owl, rock ptarmigan.

The Horned Lizard

PROGRAM NINE

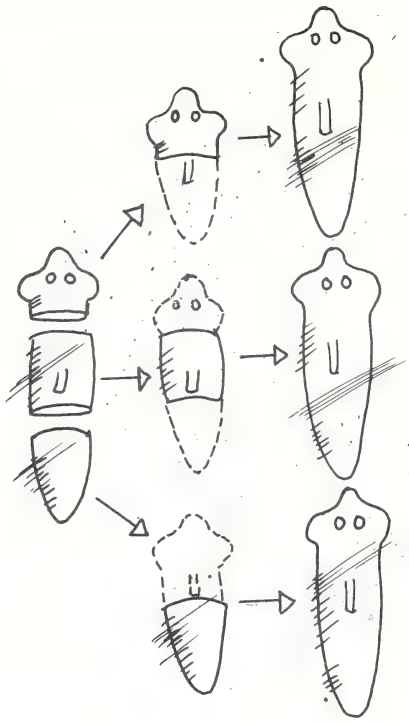
The horned lizard was once popularly referred to as "the horned toad." This misnomer is cleared up through a comparison of the characteristics of **reptiles** and **amphibians**. The program gives insight into how zoologists track and capture specimens by analysing the habitat preferences of a species. The program also traces the **life cycle** of a horned lizard and introduces some of the ways in which this animal protects itself from predators.

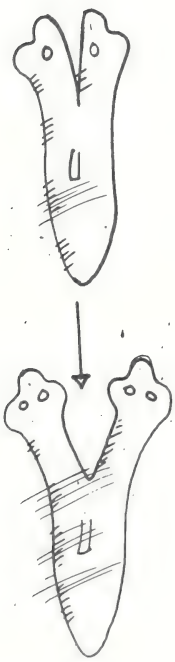
Pre-listening questions and activities

1. Introduce the term "hibernation." Ask students to explain why some animals hibernate. Then, with class help, compile a list of hibernating animals.
2. Locate some pictures of prehistoric lizards. Point out their protective adaptations, e.g., armored plates, horns, sharp teeth, etc. Discuss how size can be both a hazard and a help to an animal.

Post-listening questions and activities

1. As a class, create a comparative chart that outlines the difference between amphibians and reptiles.
2. If, locally, there is a good biological supply house, invest in a number of live planaria. These small worms have tremendous powers of regeneration. By cutting the worms according to the diagrams on page 12, students will be able to observe the regeneration process.
3. List on the chalkboard, with student help, the ways in which horned lizards protect themselves from enemies.
4. Divide the class into small groups and assign each group an insect or some higher animal. Have each group design a poster that outlines the life cycle of their assigned creature.





A planarian is a fresh-water flatworm with the remarkable power to regenerate when cut apart. If cut above and/or below the tube-like pharynx that leads to the mouth, a whole new planarian is formed. And if the head is slit, two heads will grow.

The Cottontail Rabbit

PROGRAM TEN

Nearly defenceless and prey for many larger animals, the cottontail rabbit is unlikely to live longer than a single year. This program examines some of the characteristics and behavior of this rabbit.

Pre-listening questions and activities

1. Make a list of well-known rabbit characters from cartoons or literature (Bugs Bunny, Peter Cottontail, etc.). Ask students to describe the fictionalized rabbits, then discuss how well these descriptions depict real rabbits.
2. List the animals that prey on rabbits and discuss the importance of rabbits in the **food chain**.

Post-listening questions and activities

1. Like rodents (e.g., rats, mice, and squirrels), a mating pair of rabbits produces offspring very rapidly. Ask students to research other wildlife, comparing:
   a) gestation period
   b) number of offspring
   c) how long it takes for the young to reach maturity.

   Ask students to speculate why these differences exist among various species.
2. Discuss the special features of rabbits' teeth. Do any other animals have specialized teeth to help them eat certain food?
3. The wildlife stories of Ernest Thompson Seton are entertaining and informative for students. Suggest that they read them on their own.
4. Introduce the following terms: **carnivorous**, **herbivorous**, and **omnivorous**.

   Create a wall chart listing the characteristics of herbivores, carnivores, and omnivores. Identify species that belong to each group, and describe the type of teeth possessed by each group.

The Red-Tailed Hawk

PROGRAM ELEVEN

This program follows the fortunes of a red-tailed hawk family, providing insight into their life and hunting patterns.

Pre-listening questions and activities

1. Hawks are **predators**. What useful purpose do predators serve in nature?

   What other birds can be classified as predators? What do they all have in common?

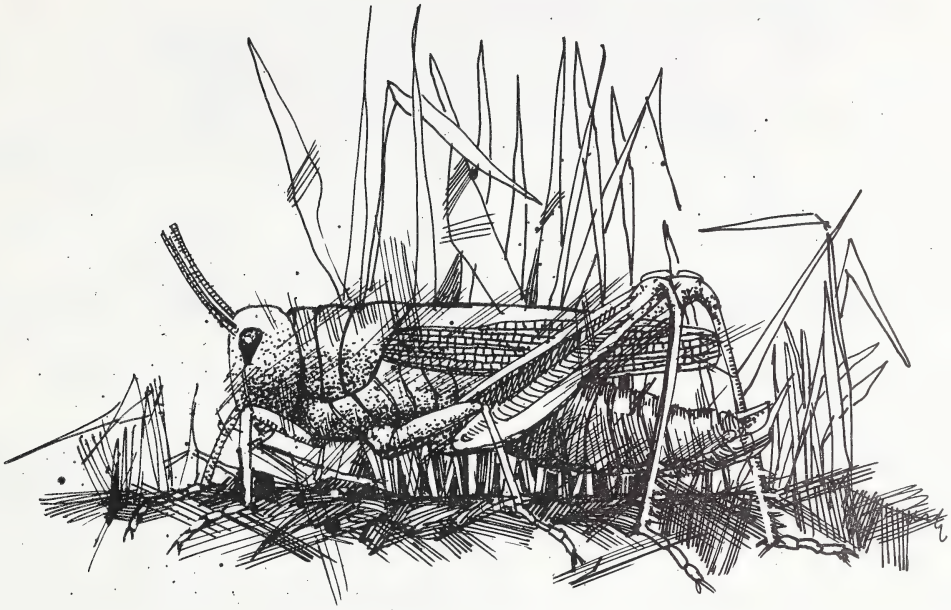
2. Study a copy of wildlife legislation dealing with birds and discuss the purpose of such laws.

Post-listening questions and activities

1. Have students observe birds around the schoolyard in order to identify flying techniques: swooping, soaring, turning, diving. Ask them to speculate about the purpose of each manoeuvre.
2. Using the chalkboard, compile a list of prairie birds protected by law.
3. Ask students to imagine themselves a bird of their own choosing and to write a journal or short story about their life. Their composition should provide insights into hunting techniques and types of prey, family life or mating habits, all in imaginative detail.
4. Select well-known, migratory prairie birds. Ask students to research their migration routes and draw these flyways on a classroom map.
5. Discuss with the class the physical characteristics that enable birds to fly.
6. Leonardo da Vinci studied birds for the purpose of investigating flight. Display photographs of his drawings of birds' wings and show how he applied his knowledge to designs of flying machines.

The Grasshopper

PROGRAM TWELVE



This program examines the vital role played by the grasshopper in the prairie food chain, and discusses this insect's fascinating adaptations.

Pre-listening questions and activities

1. Since grasshoppers can pose serious threats to crops, insect populations are sometimes controlled through the use of pesticides.

   Discuss the pros and cons of pesticides and suggest alternative methods of controlling insect populations.

2. Speculate about how the grasshopper defends itself against predators.

Post-listening questions and activities

1. Mark off 3-square-metre areas in the schoolyard, being careful to include as many different kinds of terrain as are available, e.g., flat and sandy, rocky, treed. Include areas that are close to the school building, since many spiders and mites live on external walls.

   Assign two students to investigate each plot of land and find at least two different types of insect. (There are about 700,000 known species, so there shouldn't be a problem. *But spiders do not qualify:* they are *not* insects.) Instruct them to check under rocks, and to sift through topsoil for specimens. Ask students to collect their specimens so that class attempts can be made to identify them.

2. Obtain live grasshoppers or crickets from a pet store. Have students examine the specimens with a magnifying glass, then write scientific descriptions based on their observations.

3. Prepare microscope slides of a grasshopper's wing, eye, antennae, leg, and outer "shell."

   Teach students to make their own slides. And keep a supply of specimen description forms near the microscope to enable students to hone their observation skills. (See the example of a specimen description form on p. 16.)

SPECIMEN DESCRIPTION

I. SIZE

(approximate size in centimetres)

_____

II. COLORATION

a) State the basic color GREEN-YELLOW

b) List all the other colors and where they appear on the body.

legs PALE WHITE

wings RED STRIPE UNDERNEATH

III. SEX

_____ male ___✓___ female

How do you know?

FEMALES HAVE A LONG OVIPOSITOR (EGG-LAYING ORGAN) ON THE END OF THE ABDOMEN

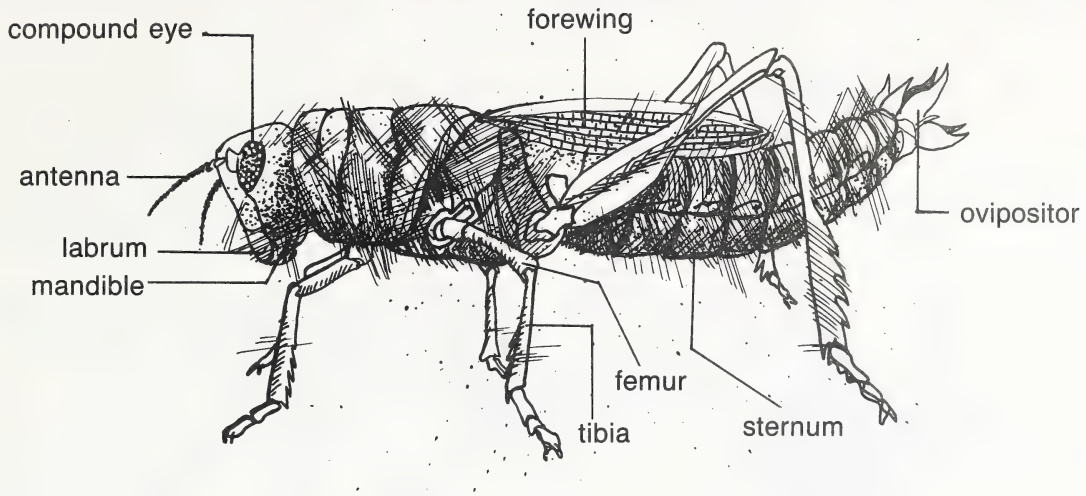
IV. LEGS

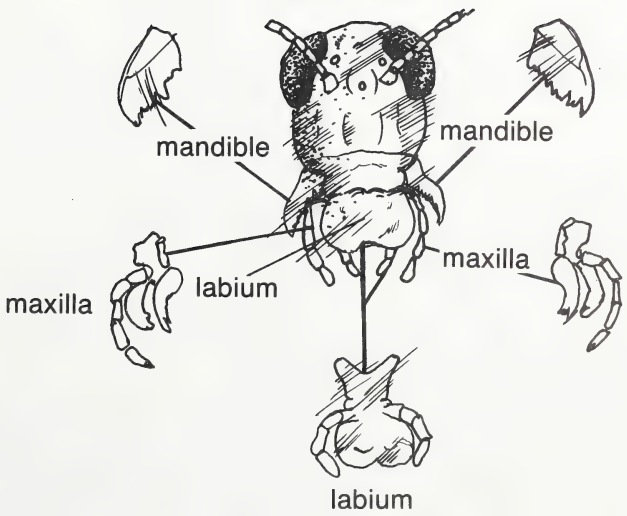
a) Number of legs SIX

b) Draw a diagram of the specimen's back legs in the space provided below.

V. HEAD

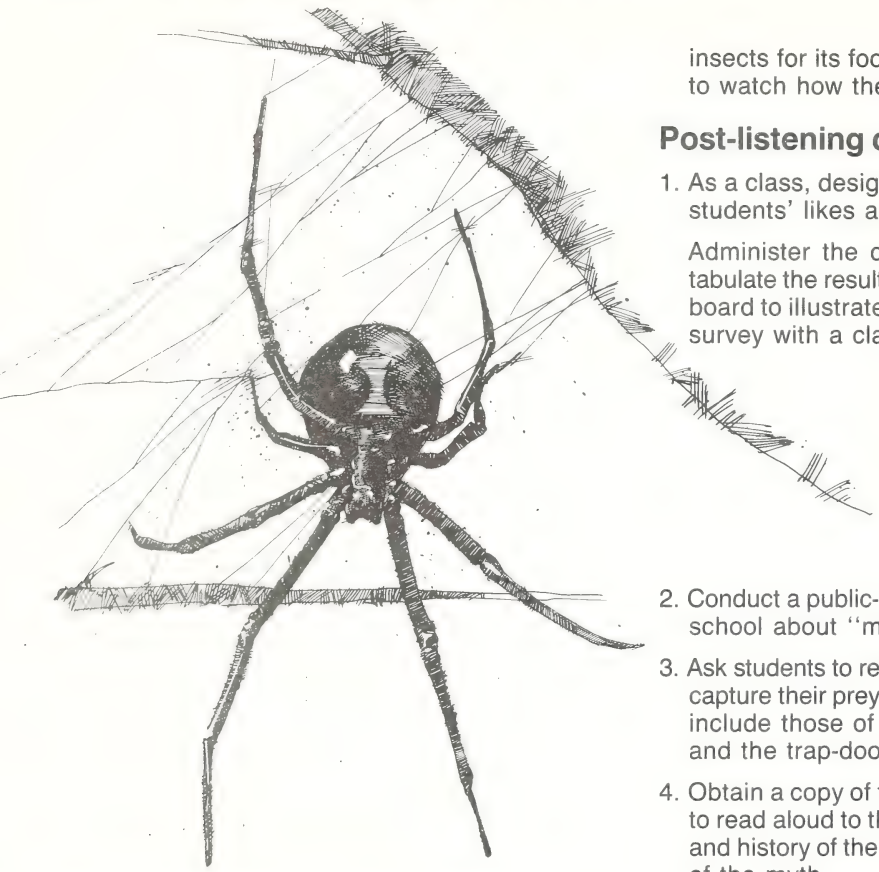
Draw a diagram of the specimen's head in the space provided below.


compound eye
forewing
antenna
ovipositor
labrum
mandible
femur
tibia
sternum


mandible
mandible
maxilla
maxilla
labium
labium

The Black Widow Spider

PROGRAM THIRTEEN



Found all over North and South America, this is Alberta's only poisonous spider. The program examines some of this creature's unusual habits and adaptations.

Pre-listening questions and activities

1. Prepare the class for a study of spiders by bringing in some specimens for observation. Give reminders as to differences in size, color, shape, leg formations, etc.
2. Have students prepare a chart outlining the physical differences of two varieties of spiders, then speculate why these differences exist.
3. Keep a spider in a terrarium (any large jar will serve nicely as a cage, with twigs or foliage to support a web) and involve students in the care of the insect by having them catch small, live insects for its food. With luck, you may be able to watch how the spider secures prey.

Post-listening questions and activities

1. As a class, design a questionnaire that surveys students' likes and dislikes in wildlife.

   Administer the questionnaire to students and tabulate the results. Prepare a chart on the chalkboard to illustrate the findings and follow up the survey with a class discussion.

2. Conduct a public-awareness campaign within the school about "misunderstood creatures."
3. Ask students to research the various ways spiders capture their prey. Interesting methods to explore include those of the wolf and hunting spiders, and the trap-door spider.
4. Obtain a copy of the Greek myth about Arachne to read aloud to the class. Examine the meaning and history of the word "arachnid" in the context of the myth.
5. Create a giant spider web by knotting lengths of black wool. Fix the web to a corner of the classroom. Have students create spiders as follows and attach them to the web or hang them from the ceiling.

   Materials required:

   a) different sizes of Styrofoam balls

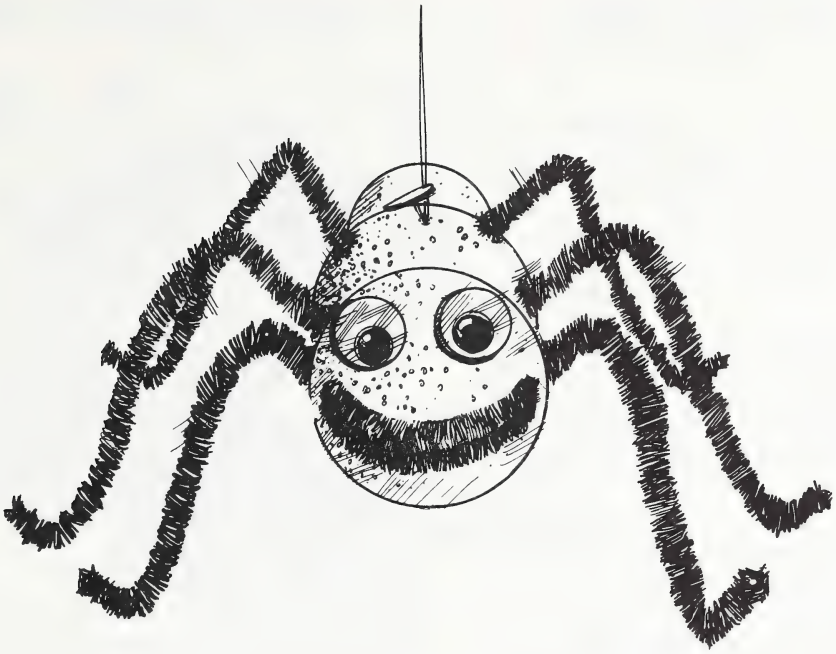
   b) black pipe cleaners (fuzzy ones)

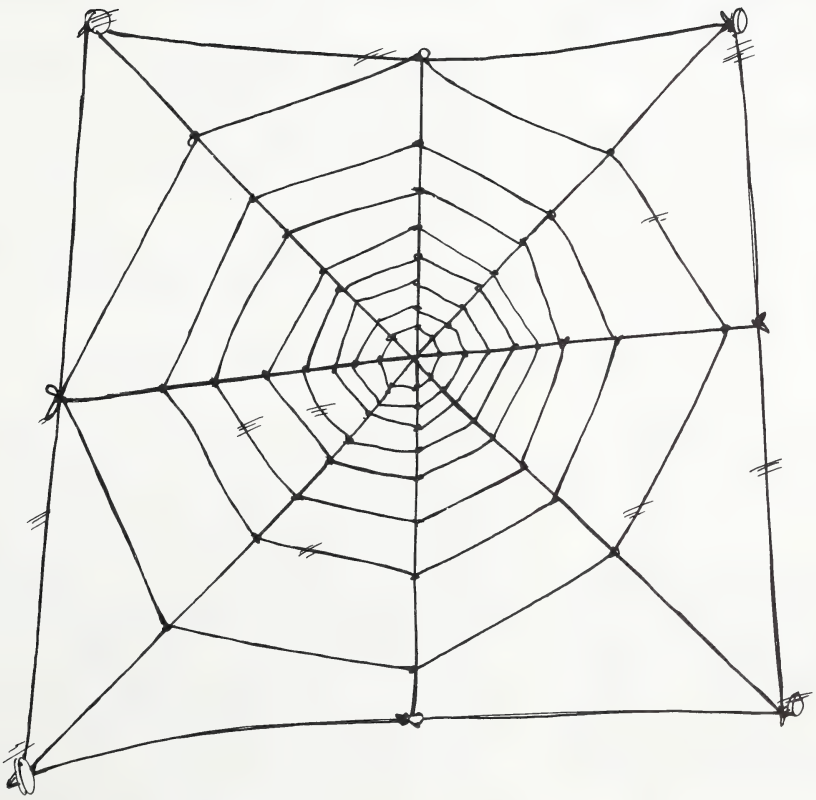
   c) assorted colors of pipe cleaners

   d) string.

   To create the facial features of the spider, cut colored pipe cleaners into small lengths. Bend the short pieces into tiny half circles and stick them onto the styrofoam ball. (Sequins, buttons or pieces of felt can also be used for facial features.)

A MAKE-YOUR-OWN SPIDER AND WEB





The Beaver

The beaver has played an important role in Canada's history and continues to play a vital role in nature conservation. It creates new ponds that become homes for other creatures and maintains the water level in old ponds by building dams across their outlet.

Pre-listening questions and activities

1. Ask students to explain why the beaver appears on a Canadian nickel.
2. Review, briefly, the development of the fur trade in Canada. Discuss why beaver fur was so very popular.
3. Ask students to listen to the audiotape for the following information:
   a) the beaver is a member of the **rodent** family
   b) the special adaptations the beaver has developed
   c) how the beaver helps other wildlife.

Post-listening questions and activities

1. The beaver is a **herbivore**. Have students find pictures of other herbivores and use the pictures to create a bulletin-board display.
2. Create a chart as shown below. In the first column, list the physical characteristics of the beaver. Direct students to recall the function of each trait.

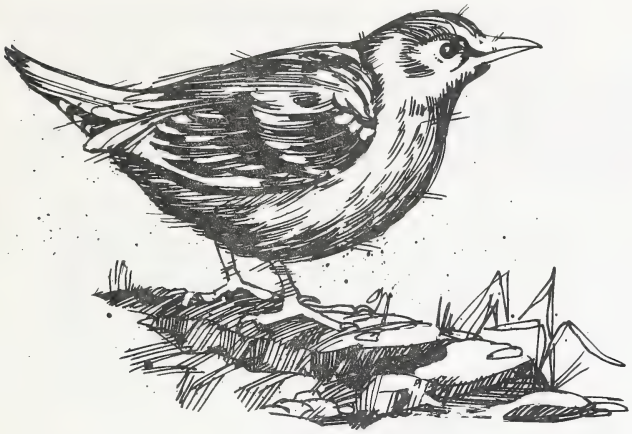
beaver's teeth	CONTINUOUSLY GROWING: CHEWING SMALL TREES
oil glands	USED AS WATER PROOFING
split claw	USED TO SPREAD OIL THROUGH COAT.
flat tail	USED TO "STEER"; TO SLAP WATER AS WARNING TO OTHER BEAVERS OF DANGER.

4. ORGANIZE A LETTER-WRITING CAMPAIGN.

   Divide students into groups and provide each with a list of government agencies, environmental organizations, and private foundations devoted to wildlife matters. (Some agencies are listed in Appendix II at the back of this **Guide**. Also consider: tourist offices in National Parks, the Greenpeace Foundation, natural history museums, etc.) Ask each group to write a letter requesting information on their area(s) of concern and for any materials that can be provided.

   As a result of this activity, not only will your school acquire some valuable reference materials, but students will be learning important research and writing skills.

The Dipper



The dipper is a songbird that makes its home in rushing mountain streams. It nests behind waterfalls and is capable of swimming underwater. This program "visits" a dipper and introduces the technique of banding.

Pre-listening questions and activities

1. Ask students to speculate on how the dipper acquired its name. (You may wish to review with students Program Three, The Pronghorn Antelope, which discusses how animals are named.)
2. How do scuba divers and deep-sea divers breathe underwater?
3. Direct students to listen for the following information:
   a) how this bird has adapted to hunting underwater
   b) what the dipper eats
   c) the characteristics of its nest
   d) one technique that scientists have developed to assist them in learning about birds.

Post-listening questions and activities

1. Conduct class research on bird-watching. In order to do so, find out:
   a) what equipment is used
   b) what kind of observations are made
   c) how to be a successful bird watcher.

   Then arrange to take students on a bird-watching expedition, if possible to a bird sanctuary in order to give them the opportunity of seeing numerous species in a natural setting. Invite a local expert along on the trip to help identify the various birds. And assist students to keep a record of their observations.
2. BIRD-WATCHERS ANONYMOUS. Many students will have bird houses or feeders in their backyards, or will see different kinds of birds on their way to and from school. Suggest that they identify the types of birds, and encourage note taking of their sightings.
3. Divide the class into groups. Assign each group a different bird to research (see below), specifically the nesting style. Each group should be prepared to explain to the class why this style is appropriate.

   Choose a diverse range of birds to assign:

   a) water dwellers: e.g., swan, crane, grebe
   b) builders: e.g., the weaver bird of Africa, the rufous oven bird of South America, the barn swallow
   c) ground nesters: e.g., the Arctic tern
   d) cold-climate adaptations: e.g., the penguin
   e) tree dwellers: e.g., woodpecker, sparrow, etc.
4. Introduce the concept of a "collective noun." Begin by asking students to give the term for a number of: cows (herd); geese (gaggle); lions (pride); fish (school); wolves (pack).

   Acquaint students with some unusual collective nouns dealing with birds, e.g.:

a *seige* of herons	a *wisp* of snip
a *plump* of wild fowl	an *exaltation* of larks
a *spring* of teal	a *watch* of nightingales
a *cast* of hawks	a *skein* of flying geese.

   Now ask students to invent their own collective nouns for animals. The following will get the class going: a *squirm* of worms; a *twitch* of rabbits; a *bob* of dippers.
5. Invite a bird conservationist as a guest speaker to demonstrate bird banding.

The Leech

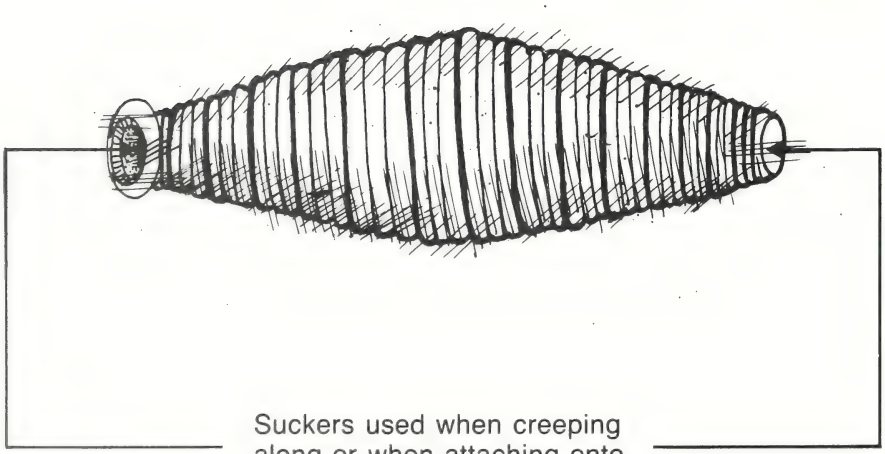
A primitive worm, the leech is well-known to swimmers in Alberta sloughs and lakes. It has an intriguing and complex life history, and its ancestors played an important role in the history of medicine.

Pre-listening questions and activities

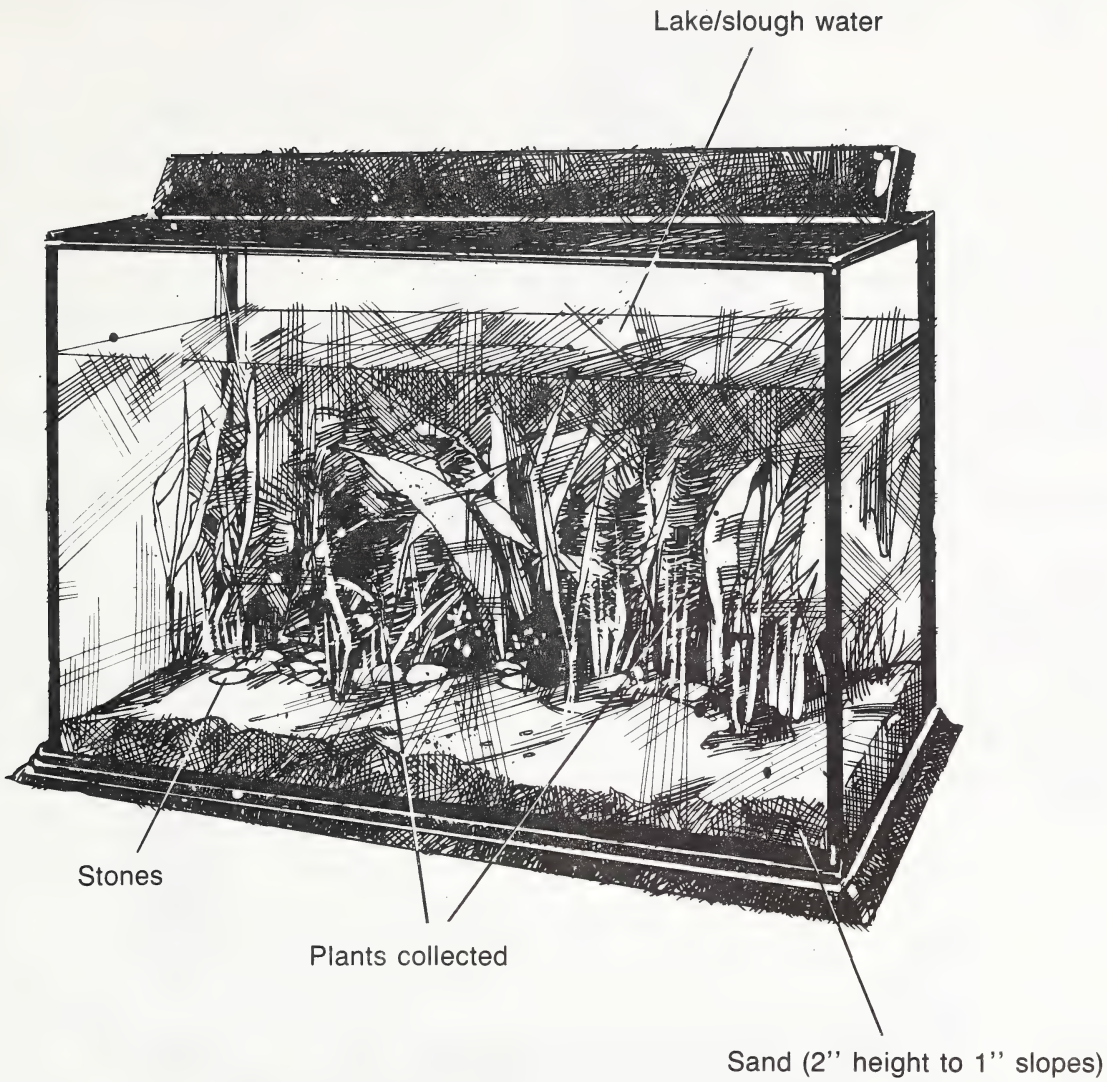
1. Discuss the various creatures that suck blood for food.
2. The term "leech" is sometimes applied to a person. What is the meaning of the word when thus used?
3. Look up the word "leech" in a dictionary. What are its various meanings?

Post-listening questions and activities

1. The leech is an invertebrate. What other animals are invertebrates?
2. Have students investigate types of leeches. (Some grow to be five feet long.)
3. Ask students to help set up a fresh-water aquarium by collecting building materials from a pond: mud, water, plants, rocks, etc. Discuss the slough ecosystem beforehand in order to duplicate a real slough as closely as possible. For any creature you wish to introduce, conduct research to ensure that all aspects of its habitat have been provided. (See the following example of a fresh-water aquarium.)



Suckers used when creeping along or when attaching onto prey.



Potential species: small water animals
hydras
planarians
leeches
aquatic insects, e.g. whirligig beetle, water boatmen, snails

The Sturgeon

PROGRAM SEVENTEEN

The lake sturgeon is related to some of the oldest species of fish on earth. Sturgeon populations have been depleted by various types of pollutants, but progress has been made in raising sturgeons in hatcheries.

Pre-listening questions and activities

1. Obtain a tin of caviar to sample with the class. Discuss other examples of exotic foods. (In some cultures, insects are eaten; birds' nest soup is considered a delicacy by Chinese; Cypriots find baby sparrows a tempting dish.)

   Utilize the ethnic make-up of your students by asking them to talk about an unusual food specific to their culture.

2. Start a discussion about various types of legendary monsters. Current examples include Ogopogo, the Loch Ness Monster, mermaids, and the Sasquatch.

   What function do legends have in the development of culture and community?

3. Ask students to listen for the following information:

   a) the size of an adult sturgeon

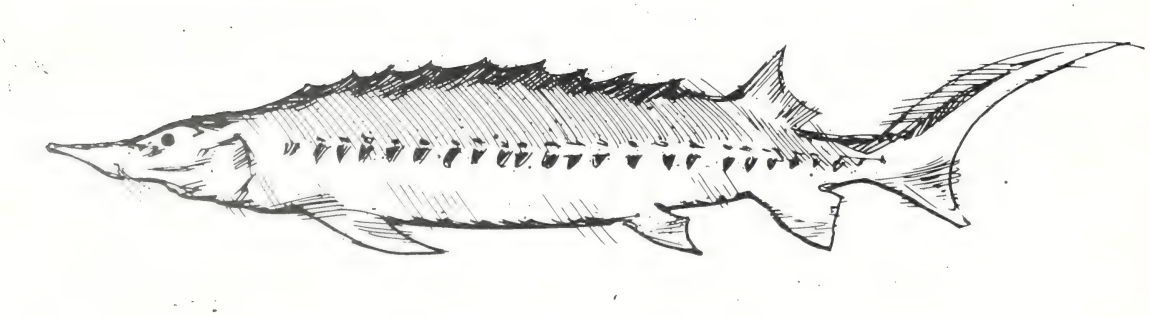
   b) what is special about the sturgeon's skeleton

   c) how the sturgeon finds its food

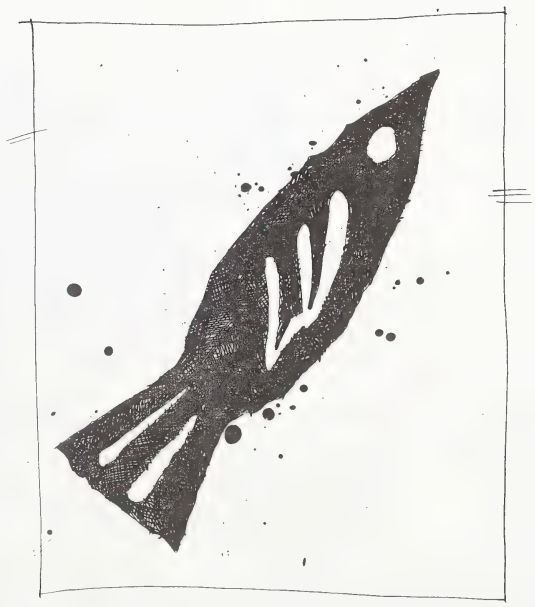
   d) why the sturgeon population is steadily growing smaller.

Post-listening questions and activities

1. Visit a water-treatment plant to find out how our water supply is purified.
2. Arrange an outing to a fish hatchery to see how fish are raised.
3. Guppies are easy to raise and breed. Have students observe a breeding cycle by setting up an aquarium in the classroom.
4. Create an underwater mural. Encourage the use of a variety of materials—macaroni for shellfish, rice or dried peas for sand, dry leaves for kelp, etc. Use a potato-print technique to create brightly colored fish in the underwater landscape. (See the illustration of this print technique on page 25.)
5. The sturgeon program could be used as a starting point for a lesson on animal fossils.

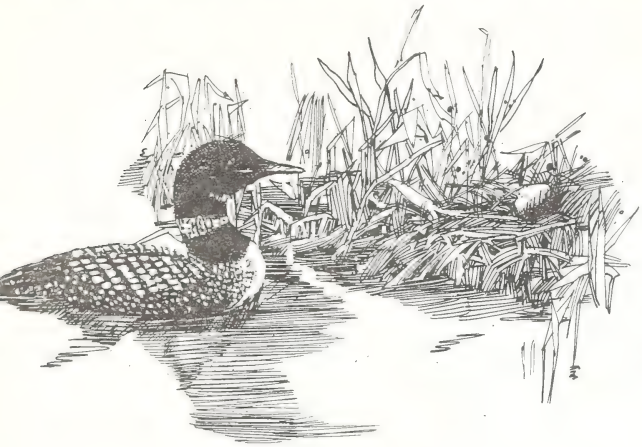


POTATO PRINTING



The Common Loon

PROGRAM EIGHTEEN



As human populations expand, the wilderness shrinks. While encroachment by us has threatened many wild species, the loon is learning to adapt to the human presence in the wild.

Pre-listening questions and activities

1. Sounds often evoke emotional responses. Play a sound-association game with students by means of recordings of animal and bird calls. Some to try are: a wolf's howl, a mosquito's buzz, a whale's sonar soundings, a loon's cry, a cat's purr.

   Students may associate a place, or a season, with a particular sound or sounds, so this activity could be used to begin a poetry lesson. The "sound images" derived from the word-association game could be developed into haiku or cinquains.

   A *cinquain* is a five-line poem that is formulated as follows:

   1st line: one word for the title, usually a noun
   2nd line: two words that describe the title
   3rd line: three verbs that describe the action of the title/noun
   4th line: four words, or a short phrase, about the subject
   5th line: one word—synonym for the title/noun.

   Example:
   Toads
   Warty swimmers
   croaking, soaking, hopping
   Time for tongue action
   Fly catchers.

   A *haiku* is a Japanese verse form consisting of three, unrhymed lines and 17 syllables. (The first line contains five syllables; the second seven syllables; the third, five syllables.)

   Example:
   Pesky mosquitoes
   Invisible astronauts
   Whining in my ear.

2. Ask students to listen for the following information:

   a) the ways in which we threaten the loon

   b) how the loon protects its family.

Post-listening questions and activities

1. Discuss ways in which we can reduce our negative impact on wildlife habitats. Topics for discussion could include:

   - littering
   - noise pollution
   - clearing/cultivating land
   - what the government is/is not doing to protect wildlife habitats
   - oil extraction in northern Alberta's Peace River region.

   Invite a representative from Fish and Wildlife, or Parks personnel, to talk to the class. Then, using the guidelines developed through your discussions, have students create slogans and posters to foster an awareness of wildlife protection.

2. Discuss the loon's adaptations, examine its strengths and weaknesses, explain its defence mechanisms, and describe how it obtains food.

3. Use the legend "How the Loon got its Necklace" to introduce other explanatory myths. Then ask students to write myths of their own. Here are some possible starters:

   a) why the beaver has a flat tail

   b) how the scorpion got its sting

   c) why the black widow spider is marked with a red, hour-glass configuration.

4. SHARPEN YOUR YEARS. (skills area—listening)

   Obtain some sound-effects recordings of animals and birds. Keep a list of the order of the sounds. Let students practise identifying the sounds they hear. (All of the audiotapes in the *BASIC LIFE SCIENCE* series contain samples that could be used for this activity.)

The Dragonfly

The dragonfly begins its life on a lake floor, then transforms itself into a living helicopter. In this program, we follow the dragonfly's **metamorphosis** and learn about its interesting habits and adaptations.

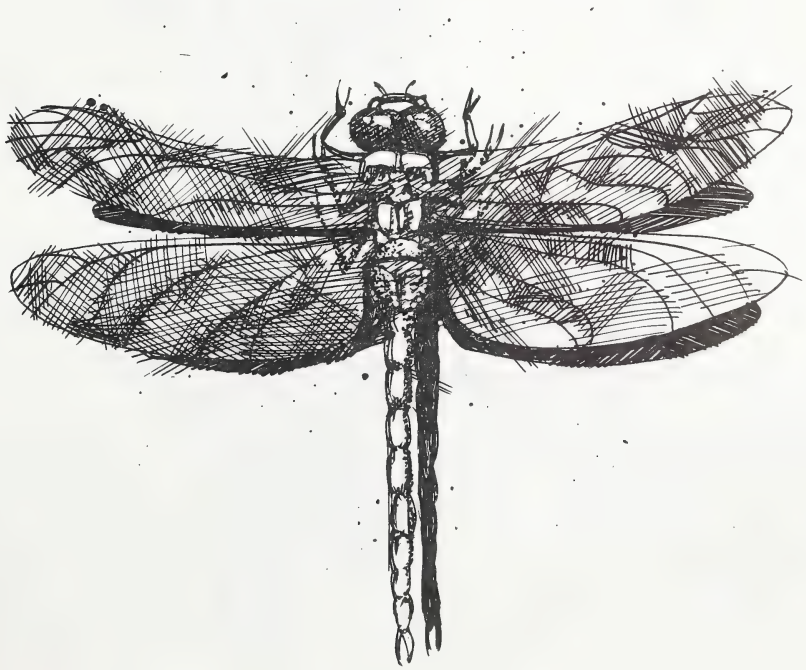
Pre-listening questions and activities

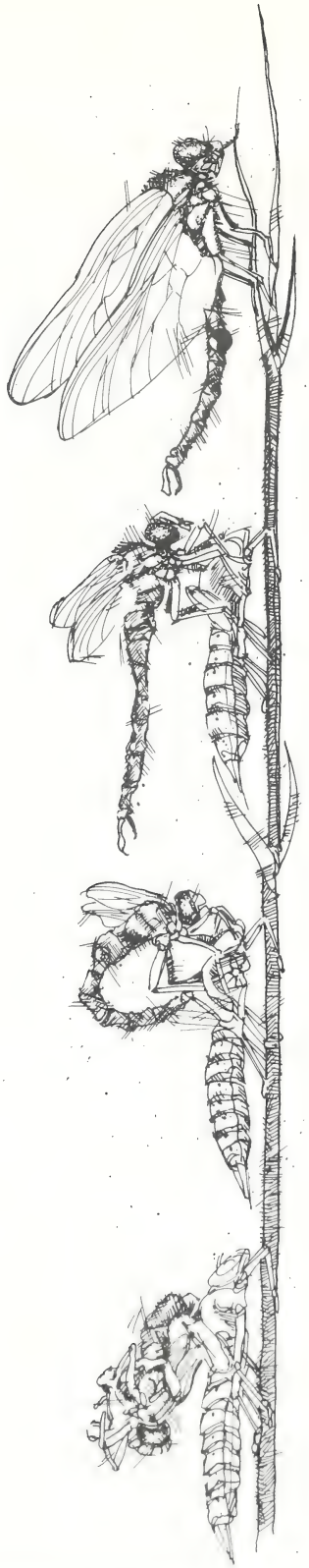
1. Ask students to speculate on how the dragonfly acquired its name.
2. Introduce the concept of metamorphosis to students. Provide pictures of the stages of development of a butterfly or a mosquito. Have students research the origins of the word "metamorphosis."(Gk. *meta* - over + *morphē* - form).

Post-listening questions and activities

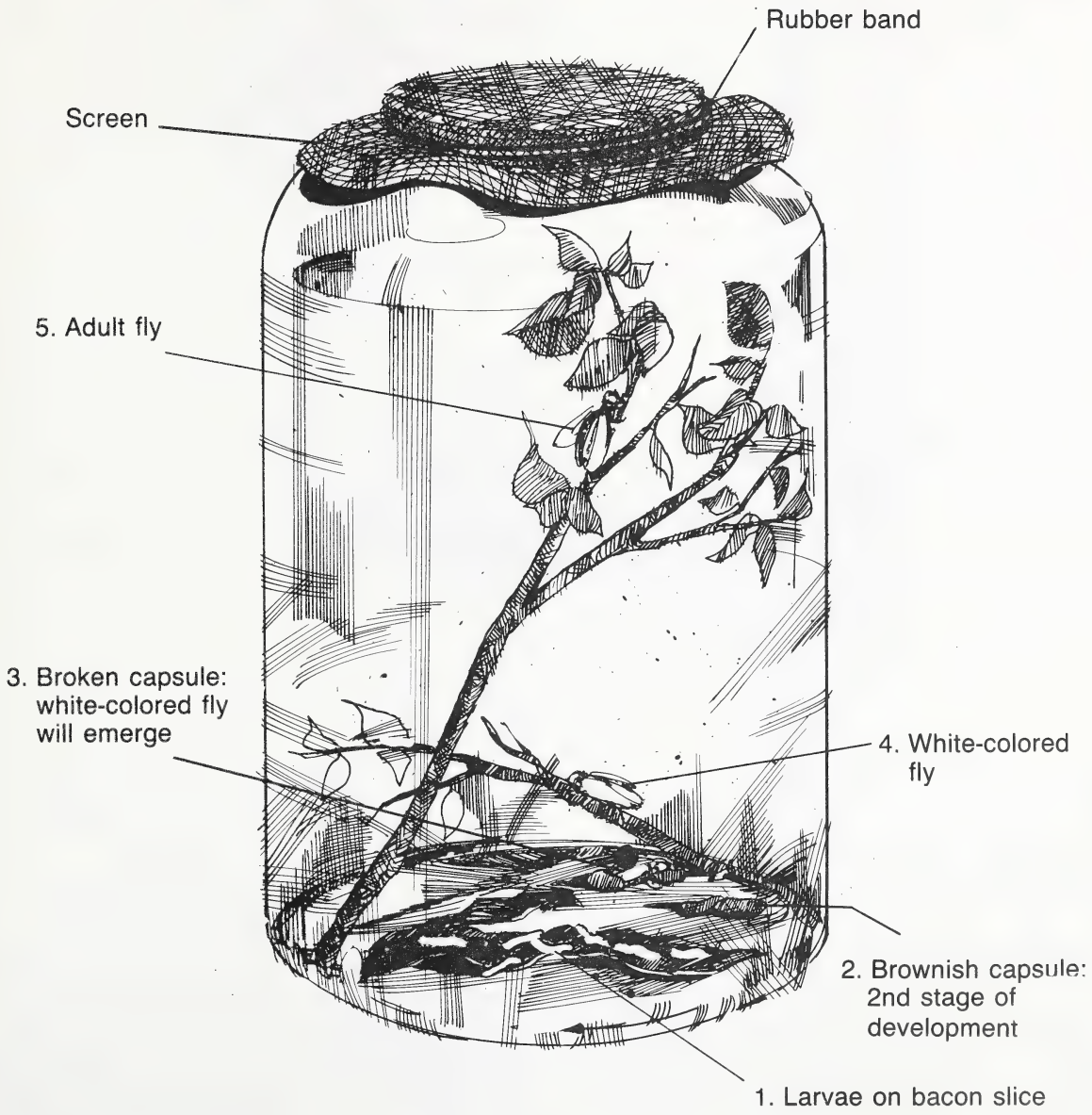
1. Ask students to imagine that they are a dragonfly and draw their habitat (either underwater or in the air) from this insect's viewpoint.
2. Have students draw a chart of the life cycle of a dragonfly.
3. Ask students to research prehistoric insects and compare modern insects with their early ancestors.
4. After discussing the similarities between a dragonfly and a helicopter, ask students to select a creature—any creature—and identify its special adaptations. Then tell them to "invent" a machine that mirrors the features of the creature they selected.
5. Observe the metamorphosis of a caterpillar or a maggot. Caterpillars can be captured in any garden; maggots can be purchased at a live-bait store. (Maggots thrive on bacon bits or hamburger. They transform very quickly, so it is possible for students to witness the process several times.)

   Assist students in preparing written observations, taking particular note of the length of the process. (See the illustration on page 29.)



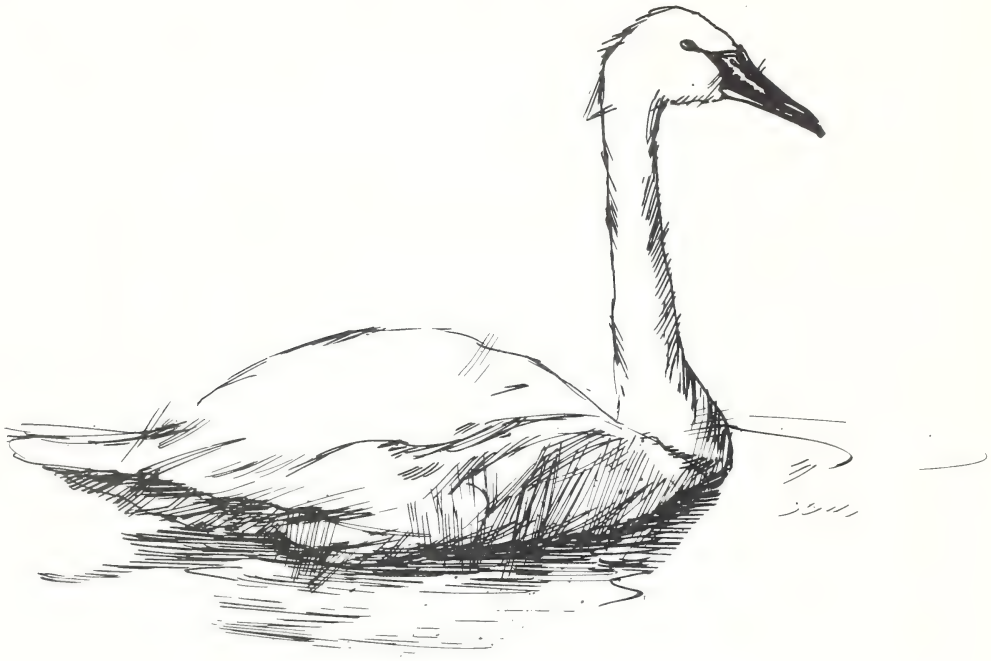


Four stages in the gradual emergence of a dragonfly. The nymph crawls out of the water onto a reed, After it frees itself from the nymphal skin, the internal organs develop, as do the stumpy wings.


Rubber band
Screen
5. Adult fly
3. Broken capsule: white-colored fly will emerge
4. White-colored fly
2. Brownish capsule: 2nd stage of development
1. Larvae on bacon slice

The Trumpeter Swan

PROGRAM TWENTY



In Canada, traders and hunters destroyed trumpeter swans by the thousands until only about fifty remained. Government intervention saved this bird from extinction. A significant number of the world's population of trumpeter swans nests in the Grande Prairie region of Alberta.

Pre-listening questions and activities

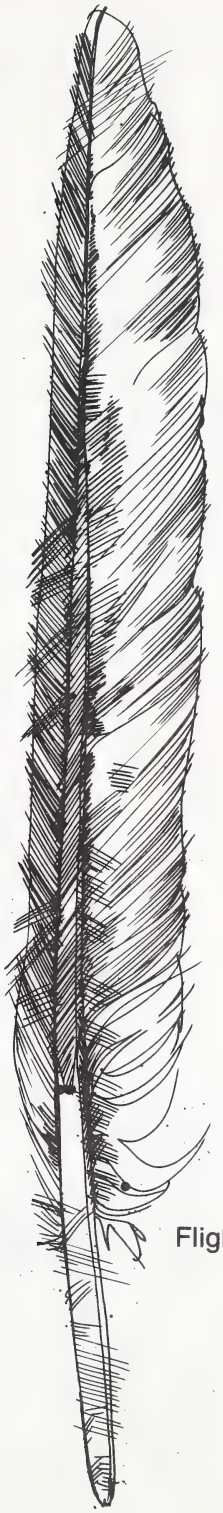
1. Bring to class samples of different kinds of feathers for students to examine. Ask them to compare "down feathers" with "flight feathers." Obtain further information on feathers by talking to a pet-store owner who raises parrots or cockateels.
2. Explore with the class the many functions feathers serve (e.g., body insulation, lining for nests, attracting mates, serving as a form of camouflage).

Post-listening questions and activities

1. Begin a feather collection in the classroom. Where possible, try to identify the source of each feather. (See the following illustration.)
2. Organize a field trip to the Provincial Museum to see the trumpeter swan diorama.
3. In a corner of the classroom, build a diorama showing the swan's nesting site. Paint a background on a large sheet of paper. Add dimension by using real plant materials in the foreground. Suspend a few cardboard cutouts of swans from the ceiling. (See the mobile illustration on page 32.) As an art project, fashion some papier-mâché swans which can be shown in the nesting position.

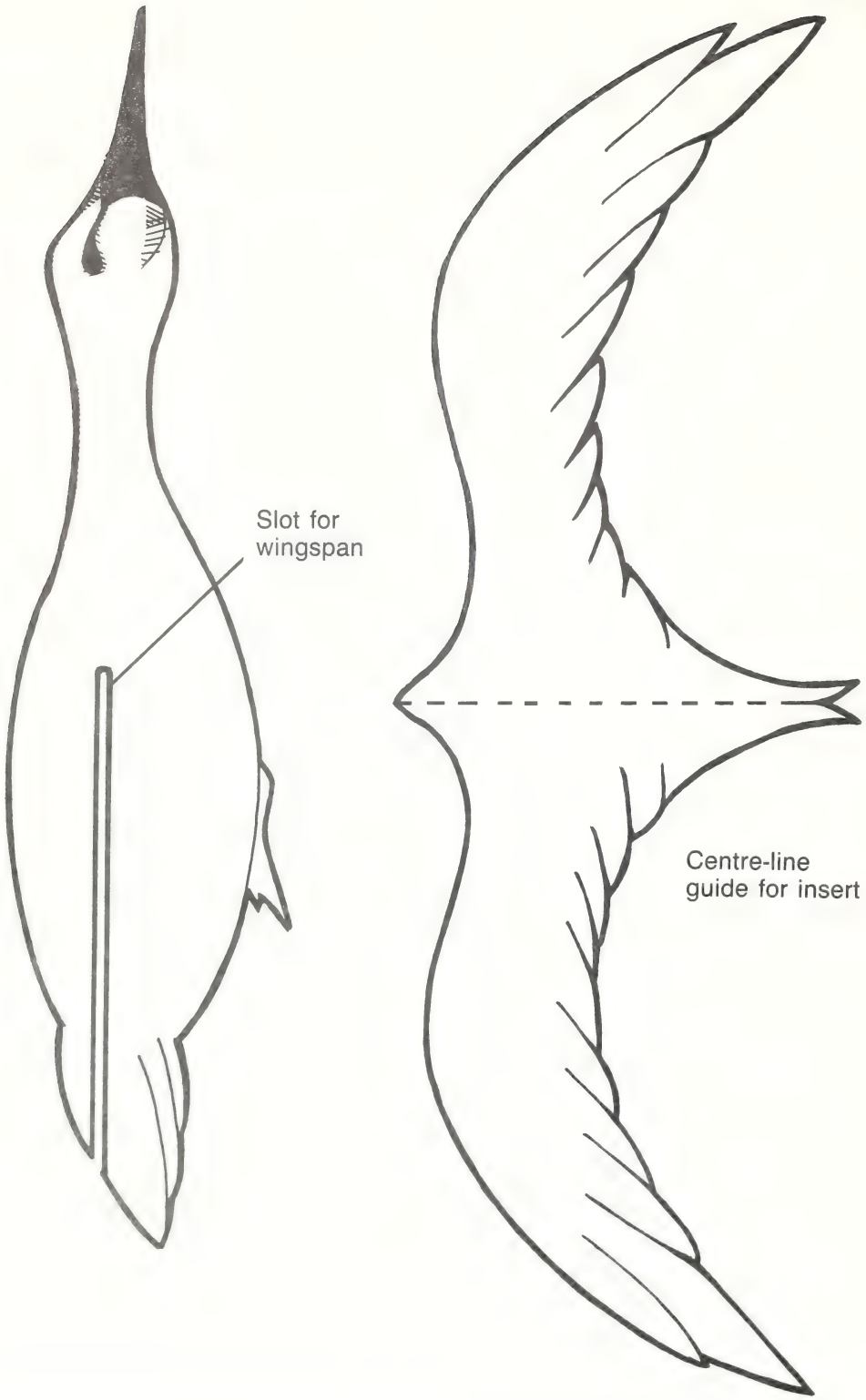
   The mobile illustration can also be used to make a swan model.

Down feather



Flight feather

Contour feather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The Rainbow Trout

PROGRAM TWENTY-ONE

The rainbow trout is one of seven varieties of trout found in Alberta. At one time, this particular species lived only in icy mountain streams near Jasper. With the development of fish **hatcheries**, it has now been introduced to numerous lakes and rivers throughout the province.

Pre-listening questions and activities

1. Ask a few of your students to demonstrate how to catch fish.

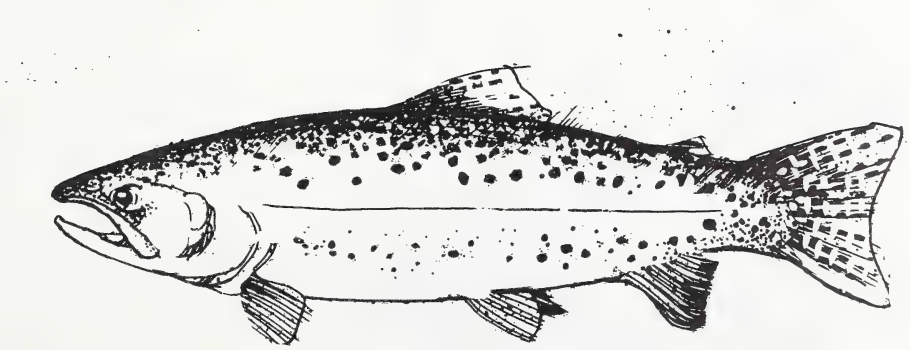
   Prepare a display of the kinds of bait that can be used, specifying the baits that attract rainbow trout.

2. Introduce the concept of **native species**. Make a list of some Alberta plants and animals, then ask students to find out whether a species is native or non-native.

Post-listening questions and activities

1. Discuss the concept of "streamlining" in terms of nature and of our world of manufactured goods.
2. Find out about certain non-native species of animals that have caused problems in their new habitats. (White egrets in Barbados, Siamese walking fish in Florida, rabbits in Australia.)

   List the factors that should be considered before introducing a new species to a different environment or region of the world.



The Common Goldeneye

PROGRAM TWENTY-TWO

The goldeneye is a diving duck which feeds on underwater life, yet nests in holes in trees, sometimes as much as forty feet above ground. Goldeneyes have special adaptations that help them adjust to different habitats.

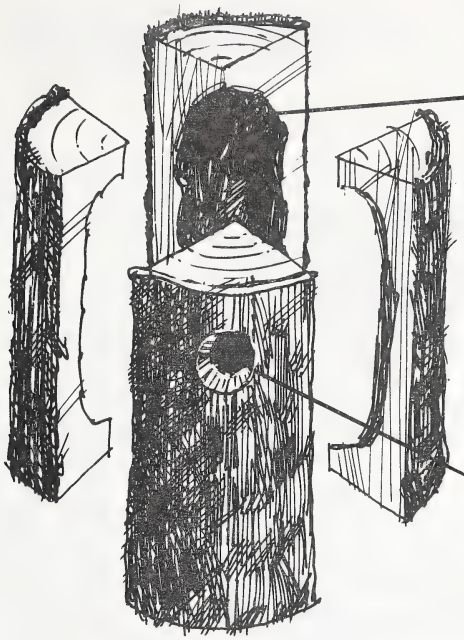
Pre-listening questions and activities

1. Discuss the special adaptations that all water birds share, e.g., waterproof feathers, webbed feet, etc..
2. Review the nesting habits of various birds. Then discuss the advantages and disadvantages of various nesting styles. (Some birds such as the African honey guide, most cuckoos, and North American cowbirds have an unusual family arrangement. Females lay their eggs in the nest of another species, leaving the new mother to look after eggs that she did not lay.)

Post-listening questions and activities

1. Help your class construct a nest box like the one mentioned in the audiotape. (See the following illustration.)
2. Research the ways in which different animals teach their young to hunt, fly, or swim.

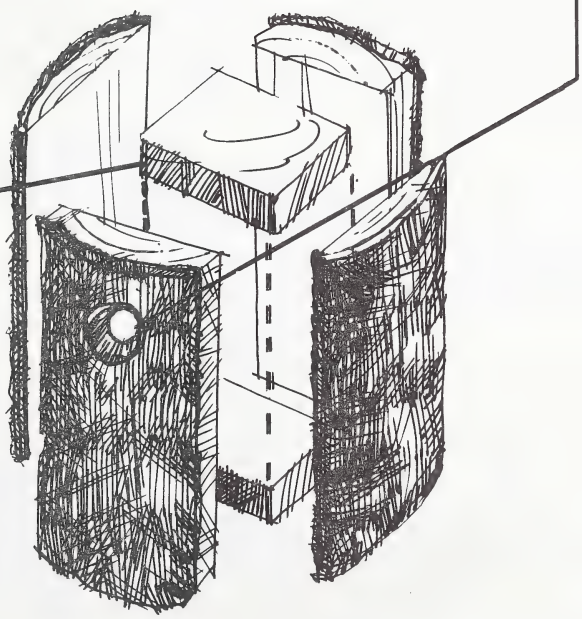
LOG BIRDHOUSES



Log is split
and hollowed out.

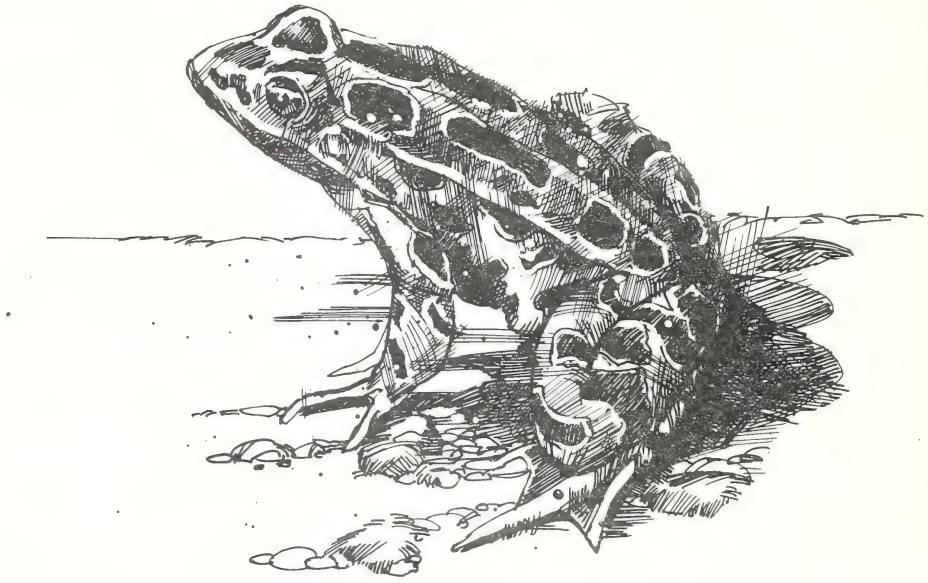
Entry hole bored, then pieces glued back together. (Use an expansive bit. When drilling, position the bit slightly up toward the inside in order to create a slant that will keep out rain.)

Log is split into slats and provided with square top and bottom.



The Leopard Frog

PROGRAM TWENTY-THREE



The leopard frog is an **amphibian** that hibernates for the winter. The program details the life cycle of this animal and explains some of the environmental conditions that threaten it.

Pre-listening questions and activities

1. Review with the class the meaning of the word "amphibian."
2. Ask students to explain the differences between frogs and toads.
3. Tell students to listen for the following information:

   a) the creatures that prey on frogs

   b) the frogs' defence mechanisms

   c) what frogs do in wintertime.

Post-listening questions and activities

1. Frogs and toads are fairly easy to keep in the classroom. Many pet stores and live-bait stores stock food that these creatures eat (maggots, crickets, meal worms).

   Before purchasing a toad or frog, carefully research its natural habitat so that your terrarium will closely duplicate its environment.

   N.B. All wild amphibians and reptiles are protected by law in Alberta. If you wish to collect wild specimens, you must obtain a special permit to do so.
2. A frog's anatomy resembles that of a human being. Obtain a preserved frog from a biological supply house to dissect for students. Help them to identify the various organs. (Plastic models of frogs are also commercially available.)
3. Investigate some of the more exotic varieties of frogs and toads, e.g., giant South American toad, flying frog of Borneo, hairy frog of Africa, Surinam toad.
4. Pose the following riddle for students to solve:

   "What do frogs, crocodiles, and hippopotamuses have in common? (All have developed facial arrangements that allow them to see and breathe above water while the rest of their bodies are submerged.)

The Killdeer

PROGRAM TWENTY-FOUR

Killdeer can be found alongside most sloughs and lakes in the province. Females build their nests among stones, and have developed an unusual way of protecting their young from predators.

Killdeer are classified as **shore birds**: they do not possess webbed feet, and spend most of their time along sandy banks.

Pre-listening questions and activities

1. Display pictures of different types of bird eggs. Compare the size, shape, and coloration of the examples.
2. Some birds camouflage their eggs, others do not. Is there any connection between camouflaging behavior and where a bird actually nests? If so, what is the explanation?
3. With class help, list some of the problems that might be experienced by migrating birds. Which of these problems are caused by people?

Post-listening questions and activities

1. Initiate discussion/debate on whether or not egg collecting in the wild should be outlawed.
2. Divide the class into two groups. Assign each group a different species of wildlife. Have each group research how the species protects itself, and how the young are protected. From this, prepare a class chart to form the basis of a discussion as to how different animals specialize in different defences.

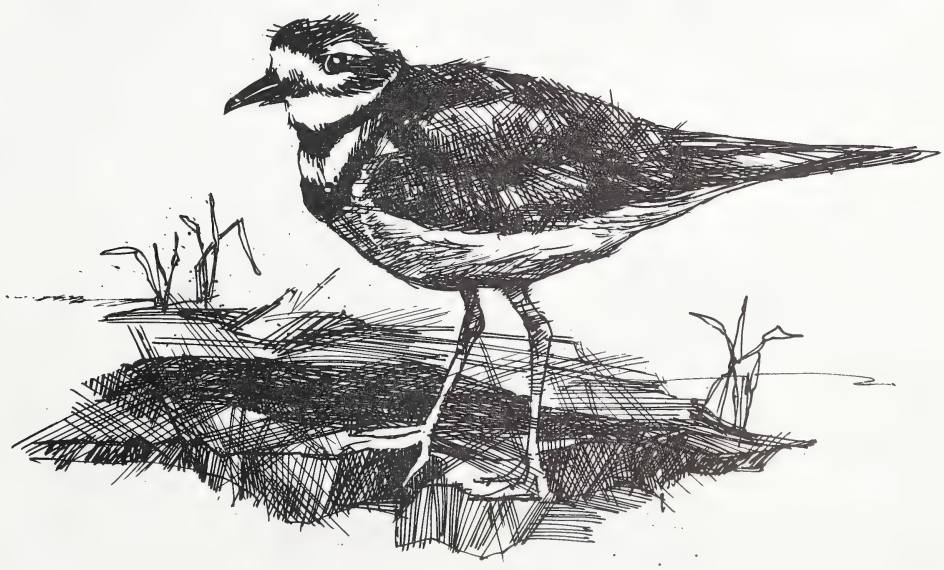
   Is there any connection between:

   a) position on the food chain and effectiveness of defences?

   b) effectiveness of defences and number of young?

3. CONSERVATION IN ACTION

   If possible, arrange a visit to a nearby wildlife sanctuary. Through your visit, or through other research activities, help students discover the purpose of a sanctuary—i.e., how it provides for needs in terms of habitat, food, shelter, air, and water—and how to set up one. Encourage students to establish a sanctuary near the classroom for the species of birds in your area. (The sanctuary could be situated in a stand of



bushes on the school grounds, or in some student's backyard.)

Here are a few suggestions to assist in attracting birds to the sanctuary:

- Provide a source of water for drinking and bathing. A bird bath, pool, or even a shallow pan of water will encourage birds as water is an essential ingredient for all habitats.
- Make sure that some cover is provided. Nesting and feeding sites should be located in a reasonably secure area (in a stand of trees, fixed on a pole, or on the eaves of a building). If the sanctuary is on the school grounds, conduct an awareness campaign to notify the rest of the school of the sanctuary's existence. Have your students write short announcements, which can be delivered over the p.a. system, and have them also create posters.
- Provide simple feeders and houses for the types of birds likely to be attracted to the sanctuary. (See the illustration on page 39.)
- If possible, plant some flowers in the sanctuary area. Not only will bright flowers provide some cover for the birds—and for some species, like the hummingbird, nectar—but they will also attract a variety of insects, which will be an additional food source.
- Foods: *seed-feeding birds*—cracked corn, commercially prepared bird seed.

  insect feeders—suet

  omnivorous—some birds, e.g., the blue jay and the chickadee, eat both plant and animal materials. Feed them oranges, apples, nutmeat.

  hummingbirds are attracted to such flowers as honeysuckle and petunias. You can also manufacture substitute nectar by mixing 1 part sugar, red food coloring, and 4 parts boiled water. (Hummingbird feeders can be purchased.)

4. WILDLIFE DETECTIVES

   Learning about nature through observation.

   This activity will enable students to identify various types of wildlife by recognizing specific footprints.

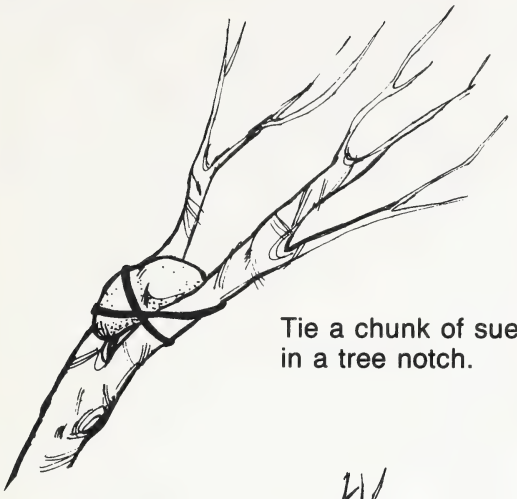
   a) Prepare a Plaster of Paris mixture as directed on the package. Prevent the mixture from setting by keeping it in a tightly sealed container, or by adding more water as necessary.

      Take a walk and look for animal tracks. Moist, sandy soil preserves imprints best, so if you are close to a creek, or pond, begin your search there. Make a cardboard collar. Pour the plaster into the track imprints and allow the mixture to harden.

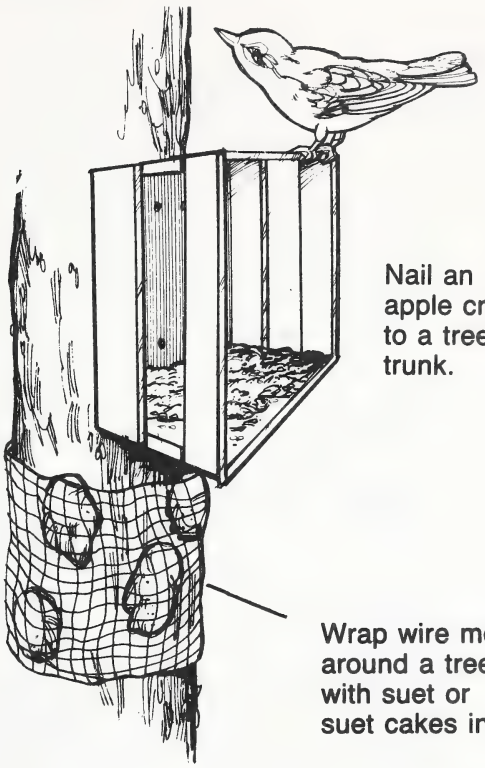
   b) With the assistance of a good reference book, have students identify and label each of the plaster casts.

   c) As an alternative to going out and finding tracks, prepare flash cards showing the name of the animal on one side and its footprints on the other. (See the illustrations and information on pages 41-44.) Students can practise their identification skills alone or in pairs.

HOW TO BE A BIRD FRIEND



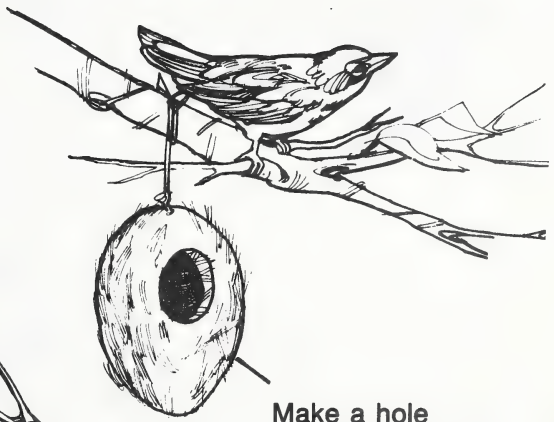
Tie a chunk of suet in a tree notch.



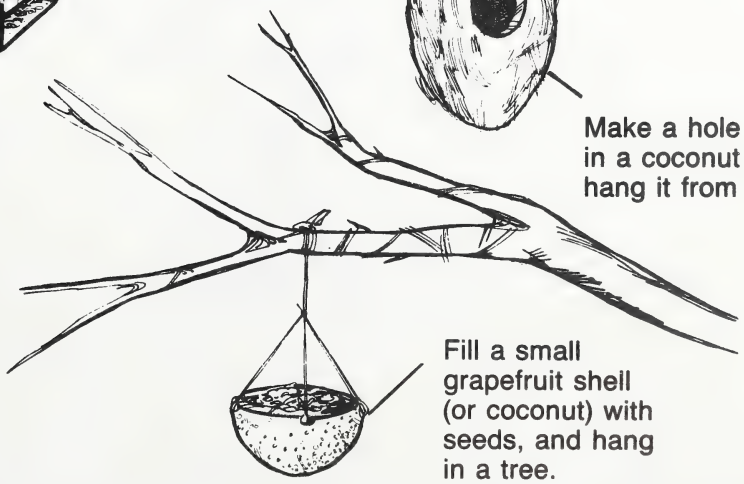
Nail an apple crate to a tree trunk.

Wrap wire mesh around a tree with suet or suet cakes inside.

Make a hanging feeder out of a milk carton.



Make a hole in a coconut and hang it from a branch.



Fill a small grapefruit shell (or coconut) with seeds, and hang in a tree.

ANIMAL TRACKS

Chipmunk

Domestic cat

hind

Mink

left front

left hind

Skunk

front

hind

Prairie dog

front

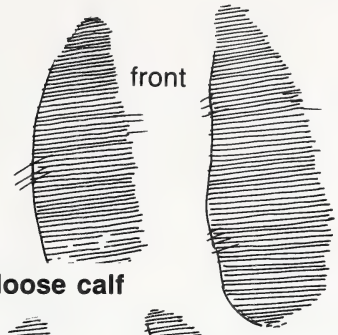
hind

Otter

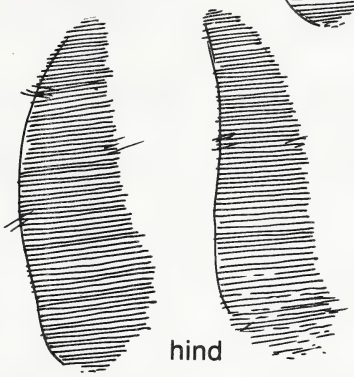
front

hind

ANIMAL TRACKS



Moose calf

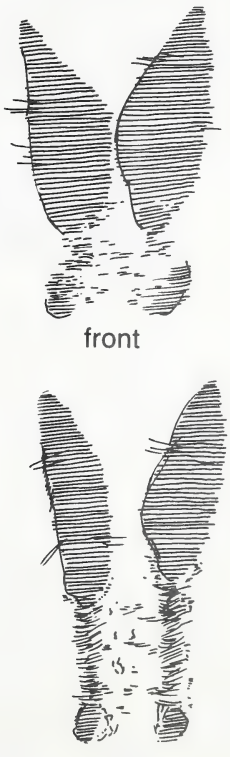


Coyote

Wolverine

Yearling grizzly

Whitetail deer



Beaver

The Otter

PROGRAM TWENTY-FIVE

The otter lives along the shores of large Alberta rivers. Sought by trappers for its thick, soft fur, the otter has learned to move mainly by night. As a result, we have little opportunity to enjoy its playfulness.

Pre-listening questions and activities

1. Many animals have developed keener senses than ours. Give students the opportunity of experimenting with their senses.

   a) Fill a bag with familiar objects. Blindfold students and ask them to identify the objects by the sense of touch.

   b) Select a number of foods and familiar spices. Have one group of students identify the samples using only the sense of smell. Have other groups identify the samples by taste.

   c) Record a number of sounds for the class to identify.

2. Ask students to consider the importance of each sense. Ask them to rank the senses in order of personal importance.

   Assign the following homework question:

   "Imagine that you are asked to give up one of your five senses. Which one would you give up? Why?"

Post-listening questions and activities

1. Research the modern fur industry. Which animals are farmed, and which are trapped in the wilds?

   Debate the question: "Should people buy fur coats?"

   Prepare a list of laws based on the results of your debate. Also consider the penalties for people who break your new laws.

2. Design a wall chart in which there is one column for each of the five senses. In each column, identify, with class help, animals that are particularly noted for the sense in question.

3. Like human beings, the otter is a mammal. Explore the characteristics of mammals by comparing the similarities and differences between any two mammals.

The Osprey

The osprey is a magnificent water predator and has developed efficient fishing techniques. The osprey is now threatened by pesticides, which are introduced into the food chain at a lower level.

Pre-listening questions and activities

1. Display pictures of the feet and beaks of various types of birds, e.g.:

   seed-eaters—parakeet
   nectar-eaters—hummingbird
   insect-eaters—sparrows
   meat-eaters—owls, eagles.

   Discuss how each beak and foot is adapted for specialized functions.

2. Direct students to listen for the following information:

   a) how the osprey captures its food

   b) what the osprey eats

   c) the threats we pose to the osprey.

Post-listening questions and activities

1. Draw a diagram of the osprey's food chain, indicating where poisons enter the chain. Then discuss the positive and negative effects of pesticide use.

2. Find other examples of fish-eating birds. Compare their hunting styles and beak and foot design.

Appendix I

Project Wild Utilization

Project Wild is a new, environmental-education program that is being piloted for use in Alberta schools. The objects of the *BASIC LIFE SCIENCE* series are closely related to those of *Project Wild*, and the following information indicates some of the ways in which the audio programs could be used as a resource for *Project Wild* activities. In each instance, the *Project* activity chosen is one intended for the target audience (Grades 4-6) and one that can be illustrated by material from *Listen to the Prairie, Stream Stories*, or both, as annotated. (Certain activities have been selected from each of the main sections of *Project Wild;* many others are feasible.)

PROJECT WILD

SECTION ONE: AWARENESS AND APPRECIATION

1 Interview a Spider
(Any of Programs 1-5, 7-26 can be used as raw material for the species being "interviewed.")

7 Grasshopper Gravity
(Program 12 on grasshoppers is valuable support material.)

10 Stormy Weather
(Programs 3 and 13 are among those introducing dramatic weather, and could be used to start off the entire study.)

16 Habitat Rummy
(Any of Programs 1-5 and 7-26 present the raw material for examples of this educational game.)

17 My Kingdom for a Shelter
(Programs 4, 10, 11, 13, 14, 15, 18, 20, 22, 24, 25, and 26 all present interesting examples of natural shelters.)

18 What's for Dinner?
(Most programs present data for the construction of food chains.)

19 Litter We Know
(Program 20, "The Trumpeter Swan", presents an interesting situation where lead shot 'litter' is poisoning swans.)

20 Tracks
(Programs 24, "The Killdeer", and 25 "The Otter", make significant use of tracks and could be used as introductory material.)

SECTION TWO: DIVERSITY OF WILDLIFE VALUES

21 Wild Words
(*Naturalist* and other periodicals are quoted in many of the programs, including Programs 3, 8, 12, and 20.)

22 "Animal Poetry"
(Poetry from various sources is used in Programs 4, 12, and 13.)

24 "Let's Go Fly a Kite"
(To introduce the concept of aerial travel, Program 11 has a simulated balloon flight.)

26 "Seed Need"
(Program 6 deals with the northward migration of cacti.)

28 "Make a Coat"
(Programs 1, 7, 12, and 14 deal with the use of animal materials to make clothing.)

SECTION THREE: ECOLOGICAL PRINCIPLES

30 "Graphananimal"
(Compares animals of two habitats. Any portion of the two audio series can be used as raw material for this activity.)

32 "Good Buddies"
(Program 16 also presents an example of an internal parasite.)

34 Pond Succession
(The programs in *Stream Stories* describe 14 creations of a pond, and 23 temporary ponds.)

35 The Thicket Game
(Program 10 specifically introduces the students as "prey" and the teacher as "predator" by way of example.)

36 Adaptation Artistry
(Programs 4, 5, 8, 11, 15, 18, 20, 22, 24, and 26 all introduce examples of bird adaptations.)

37 Seeing is Believing
(Programs 4, 11, and 15 discuss vision in predators.)

40 Quick Frozen Critters
(Most programs present aspects of predator/prey relationships.)

46 Owl Pellets
(Program 4 discusses this matter.)

SECTION FOUR:
MANAGEMENT AND CONSERVATION

47 Wildwork
(Wildlife-related occupations are presented in several programs, including amateur naturalist in 2 and 22, ornithologist in 15, fisheries biologist in 17, wildlife biologist in 20, and fisherman in 21.)

49 Here Today, Gone Tomorrow
(Formerly endangered species are presented in Programs 1, 3, and 20 and a number of threatened species in 4, 8, 17, 18, and 26.)

50 Who Lives Here?
(Program 21, "The Rainbow Trout", discusses the importation of species, and Program 6 discusses the impact of cacti on Australia.)

52 Smokey the Bear Said What?
(Program 3 discusses the effects of prairie fire.)

53 Checks and Balances
(Programs 1, 3, 14, and 25 present examples of wildlife populations that could be used for this topic.)

54 No Water Off a Duck's Back
(Programs 12, 17, 18, 20, and 26 discuss the effects of pollutants.)

55 The Hunter
(Programs 1, 3, 10, 14, and 25 deal with hunted animals.)

SECTION FIVE:
PEOPLE, CULTURE AND WILDLIFE

57 First Impressions
(Animals often disliked are discussed in Programs 2, 7, 9, 12, 13, and 16.)

58 And the Wolf Wore Shoes
(Stories of animals from different traditions are used in Programs 2 and 10.)

63 Wildlife in National Symbols
(Program 14 on the beaver discusses some aspects of one of Canada's national symbols.)

64 Changing Attitudes
(Examples of changing attitudes are given in Programs 1, 3, 14, 20, 25, and 26.)

SECTION SIX:
TRENDS, ISSUES AND CONSEQUENCES

67 Shrinking Habitat
(Changes in habitat are discussed in Programs 1, 3, 14, 17, 18, 20, 24, and 26.)

68 Migration Barriers
(Programs 4, 5, 11, 15, 18, 20, 24, and 26 discuss migration.)

69 To Zone or Not to Zone
(Program 18 presents an example that could be used as a basis for study.)

70 Deadly Links
(Pesticides and their effects are discussed in Programs 12, 18, and 26.)

SECTION SEVEN:
RESPONSIBLE HUMAN ACTIONS

73 Ethi-thinking
(Many instances in the programs could be used as examples for this project.)

81 Enviro-Ethics
(Programs 12, 14, 16, 18, 21, and 25 introduce ethical issues that can be used for study.)

Appendix II

Useful Addresses

Alberta Department of the Environment,
Public Communications Division,
Oxbridge Place,
9820 - 106 Street,
Edmonton, Alberta T5K 2J6
Information on environmental issues in Alberta.

Alberta Fish and Wildlife Division,
Department of Energy and Natural Resources,
9920 - 108 Street,
Edmonton, Alberta T5K 2M4
Information on Alberta wildlife.

Alberta Department of Recreation and Parks,
Standard Life Centre,
10405 Jasper Avenue,
Edmonton, Alberta T5J 3N4
Information on Alberta Parks.

Blue Lake Centre,
Alberta Recreation and Parks,
Box 850,
Hinton, Alberta T0E 1B0
Courses on nature interpretation.

Calgary Zoo and Natural History Park,
St. George's Island,
Calgary, Alberta T2G 3H4
Educational programs on natural history.

Canadian Nature Federation,
75 Albert Street,
Ottawa, Ontario K1P 6G1
Publishes the national magazine, *Nature Canada*.

Canadian Wildlife Service,
1000, 9942 - 108 Street,
Edmonton, Alberta
Information on wildlife.

Canadian Wildlife Federation,
1673 Carling Avenue,
Ottawa, Ontario K2A 1C4
Information on wildlife in Canada and abroad.

Environment Canada,
Ottawa, Ontario K1A 0H3
Information on wildlife.

Environmental and Outdoor Education Council,
Alberta Teachers' Association,
11010 - 142 Street,
Edmonton, Alberta T5N 2R1
Professional group for teachers interested in such studies.

Federation of Alberta Naturalists,
Box 1472,
Edmonton, Alberta T5J 2N5
Alberta's provincial naturalist organization publishes *Alberta Naturalist.*

John Janzen Nature Centre,
Edmonton Parks and Recreation,
10th Floor, CN Tower,
Edmonton, Alberta
Courses and exhibits.

Ministik Hills Field Study Centre,
R.R.2,
Tofield, Alberta T0B 4J0
Courses on natural history and environmental education.

National Museum of Natural Sciences,
Metcalfe & Mcleod Streets,
Ottawa, Ontario K1A 0M8
Information on natural history.

Parks Canada,
5th Floor, 220 - 4th Avenue S.E.,
P.O. Box 2989, Station M,
Calgary, Alberta T2P 3H8
Information on national parks in Alberta.

Provincial Museum of Alberta,
12845 - 102 Avenue,
Edmonton, Alberta T5N 0M6
Exhibits and publications.

Sam Livingston Fish Hatchery and Rearing Station,
1440 - 17A Street, S.E.,
Calgary, Alberta T2G 4Y9
Exhibits of live Alberta fish.

Tyrrell Museum of Paleontology,
P.O. Box 7500,
Drumheller, Alberta TO5 0Y0
Alberta's new museum of fossil remains.

Young Naturalist Foundation,
59 Front Street, E.,
Toronto, Ontario M5E 1B3
Publishes Canada's children's nature magazine, *Owl.*

Appendix III

Visual Materials

Flora and Fauna of Alberta
(a set of slides and a booklet, produced by Karvonen Films*)

Slides relevant to *BASIC LIFE SCIENCE: Listen to the Prairie* and *Stream Stories* include the following sets:

2. "Birds of the Lakeside"
   Fourteen species, including goldeneye, killdeer, and common loon.
3. "Mammals"
   Includes antelope, beaver, bison.
4. "Spiders"
   A variety of spiders and webs.
5. "Insects"
   Includes dragonfly (2 species), grasshopper, mosquito.
6. "Fishes"
   Many species, including lake sturgeon and rainbow trout.
7. "Alpine Habitat"
   Birds include dipper and horned lark.
8. "Green Plants—Producers"
   Herbs include prickly pear, cattail, water knotweed, marsh marigold, marsh ragwort, water arum.

   Shrubs include alder, prickly rose, silverberry.

FILMS

Some available films are:

ACCESS NETWORK's *Dinosaur Footprints in the Peace River Canyon.*

Cymar Films' *Prairie Spring***

Karvonen Films has such pertinent productions as *Prairie Coulee, The Loons of Amisk, Osprey's Domain.*

*Karvonen Films Ltd., 373 Wyecliff, 22560 Wye Rd., Sherwood Park, Alta. T8A 4T6 (467-7167)

**Cymar Films, 8721 Lockside Dr., Sydney, B.C. V8L 1N8

Appendix IV
Publications

Many publications were utilized as resource materials in the development of the two audio series. This list has been limited to publications that will be of most use to the teacher, notably those that are well-illustrated, Canadian, and in print. (Some may not now be in print but are likely to be available in public libraries.) Articles are usually limited to those in the *National Geographic*, which is available in most schools, and *Nature Canada* and *Owl* (which should be available in all schools.)

The general listing is followed by one or two key references for individual programs. These are, as far as is known, readily available, and relevant to Alberta fauna and flora studies.

GENERAL

Eisenhauer, J., and Kolar, B. *Rivers on Borrowed Time.* Calgary, Alta.: Alberta Wilderness Association, 1982.

Hardy, W.G., *ed., et al. Alberta: A Natural History.* Edmonton, Alta.: Hurtig Publishers, 1967.

Spalding, David A.E., *ed. A Nature Guide to Alberta.* Edmonton, Alta.: Hurtig Publishers, in conjunction with Alberta Culture, 1980.

Aquatic

Bardach, J. *Downstream: The Natural History of a River.* New York, N.Y.: Grosset & Dunlap, 1964.

Drew, Wayland, *et al. The Nature of Fish.* Toronto, Ont.: Natural Science of Canada Limited, 1974.

Paetz, M.J., and Nelson, J.S. *The Fishes of Alberta.* Edmonton, Alta.: Government of Alberta, 1970.

Russell, Franklin. *Watchers at the Pond.* Toronto, Ont.: McClelland & Stewart, 1972.

Tebby, C.D., and Smith, H.C. *Classification and checklist of Alberta fish, amphibians, and reptiles.* Edmonton, Alta.: Provincial Museum of Alberta (Natural History Information No. 28, 9pp.), 1977.

Birds

Gilroy, Doug. *Prairie birds in color.* 2nd ed. Saskatoon, Sask.: Western Producer Prairie Books, 1976.

Knight, James A., *et al. The Nature of Birds.* Toronto, Ont.: Natural Science of Canada Limited, 1974.

Salt, W. Ray, and Salt, Jim R. *The Birds of Alberta.* Edmonton, Alta.: Hurtig Publishers, 1976.

Steve, Madge. *Birdwatching.* Toronto, Ont.: John Wiley & Sons Canada Limited, 1980.

Mammals

Banfield, A. *The Mammals of Canada.* Toronto, Ont.: University of Toronto Press, 1974.

Drew, Wayland, *et al. The Nature of Mammals.* Toronto, Ont.: Natural Science of Canada Limited, 1974.

Savage, A., and Savage, C. *Wild Mammals of Western Canada.* Saskatoon, Sask.: Western Producer Prairie Books, 1981.

Smith, H.C. *Checklist of Alberta Mammals.* Edmonton, Alta.: Provincial Museum of Alberta (Natural History Information No. 27, 7pp.), 1977.

Plants

Bird, C.D., and Hrapko, J.O. *Plant Ecology of Alberta.* Edmonton, Alta.: Provincial Museum and Archives of Alberta (Natural History Division Reference List No. 145, 9pp.), 1973.

Cormack, R.G.H. *Wild Flowers of Alberta.* Edmonton, Alta.: Hurtig Publishers, 1977.

Kuijt, J. *Common Coulee Plants of Southern Alberta.* Lethbridge, Alta.: University of Lethbridge, 1972.

Prairie

Allen, D.L. *The Life of Prairies and Plains.* Toronto, Ont.: McGraw-Hill Company of Canada, 1967.

Costello, D.F. *The Prairie World.* New York, N.Y.: Thomas Y. Crowell Co., 1969.

PROGRAMS

01 The Buffalo

Park, E. *The World of the Bison.* New York, N.Y.: J.B. Lippincott Co., 1969.

Roe, F.G. *The North American Buffalo.* 2nd ed. Toronto, Ont.: University of Toronto Press, 1970.

02 The Prairie Rattlesnake

Dobie, J.F. *Rattlesnakes.* Toronto, Ont.: Little, Brown and Co. (Canada) Ltd., 1965.

Froom, Barbara. *Snakes of Canada.* Toronto, Ont.: McClelland and Stewart, 1977.

Harrison, H.H. *The World of the Snake.* New York, N.Y.: J.B. Lippincott Co., 1971.

03 The Pronghorn Antelope

Smith, H.C., *et al. Pronghorn on the Pinhorn Grazing Reserve.* Edmonton, Alta.: Provincial Museum and Archives of Alberta (Museum and Archives Note No. 1, 4pp.), 1970.

Tagg, G. "Sagebrush speedster." *Nature Canada* 3(3) (1974): 30-32.

04 The Burrowing Owl

Walker, L.W. *The Book of Owls.* New York, N.Y.: Alfred A. Knopf Inc., 1974.

05 The Horned Lark

Bent, A.C. *Life Histories of North American Flycatchers: Larks, Swallows and their allies.* New York, N.Y.: Dover Publications Inc., 1963.

06 The Prickly Pear and Pincushion Cacti

Bernshaw, Elliott and Nicole. "Cacti in Canada." *Nature Canada* 13 (3) (1984): 22-27.

Brown, A. 1970. *Old Man's Garden.* Vancouver, B.C.: Evergreen Press, 1970.

07 The Scorpion

Zahl, P.A. "Scorpions, Living Fossils of the Sands." *National Geographic.* 133 (3) (1968): 436-442.

08 The Sage Grouse

Johnsgard, P.A. *Grouse and Quail of North America.* Lincoln, Nebraska: University of Nebraska Press, 1973.

09 The Horned Lizard

Stebbins, R.C. *Amphibians and Reptiles of Western North America.* Toronto, Ont.: McGraw-Hill Company of Canada, 1954.

10 The Cottontail Rabbit

Rue, L.L. *Cottontail.* New York, N.Y.: Thomas Y. Crowell Co., 1965.

Seton, E.T. *Wild Animals I Have Known.* Toronto, Ont.: McClelland & Stewart, 1977.

11 The Red-tailed Hawk

Austing, G.R. *The World of the Red-tailed Hawk.* New York, N.Y.: J.B. Lippincott Co., 1964.

12 The Grasshopper

Clausen, L.W. *Insect Fact and Folklore.* New York, N.Y.: Macmillan Company of New York, 1961.

Philip, H.G. *Insect Pests of Alberta.* Edmonton, Alta.: Alberta Agriculture (n.d.).

13 The Black Widow Spider

Cooke, J.A.L. "Unveiling the Black Widow." *Natural History* 82 (2) (1973): 66-75.

14 The Beaver

Oertli, E.F. "The Beavers of Kananaskis Forest." *Nature Canada* 5 (1) (1976): 3-8.

Ross, J. "Beavers at Work." *Owl* 7 (4) (1982): 12-17.

Rue, L.L., *The World of the Beaver.* New York, N.Y.: J.B. Lippincott Co., 1964.

15 The Dipper

Stirling, D. "Dipper." *Nature Canada*, 12 (1) (1983): 12-15.

16 The Leech

Buchsbaum, R., and Milne, L.M. *The Lower Animals.* New York, N.Y.: Doubleday & Co., Inc., 1960.

17 The Sturgeon

Paetz, M.J., and Nelson, J.S., *The Fishes of Alberta.* Edmonton, Alta.: Government of Alberta, 1970.

18 The Loon

Raffan, J. "The Mysterious Life of the Common Loon." *Nature Canada,* 13 (3) (1984): 28-33.

19 The Dragonfly

Appleton, F.M. "Dragonflies and Flight." *Nature Canada,* 3 (3) (1974): 25-29.

Cannings, R.A. "Dragonfly Days." *Nature Canada,* 11 (2) (1982): 12-17.

Savan, B. "The Life of a Dragonfly." *Owl,* 4 (6) (1979): 14-17.

20 The Trumpeter Swan

Banko, W.E. *The Trumpeter Swan.* Lincoln, Nebraska: University of Nebraska Press, 1960.

Stowe, L. *The Crusoe of Lonesome Lake.* New York, N.Y.: Random House, Inc., 1957.

21 The Rainbow Trout

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Getting the Most from an Audio Presentation

Audio can be an effective and stimulating learning resource. Radio, because of its ability to excite the imagination and deal with subjects that can't be "seen" with a camera, extends opportunities for learning. In addition, support materials are available for a number of ACCESS Radio CKUA AM•FM programs. Many of these materials—which include teacher/student guides and manuals, slides, transparencies, filmstrips, posters, etc.—contain suggestions for pre-listening and post-listening activities.

Many teachers have found that the effectiveness of audiotape can be enhanced in the following ways:

1. Listen to the tape before playing it for students. It is important to identify key concepts or issues in the program(s).
2. Tell students what you'd like them to listen to **before** playing a tape. Most of their listening behavior has been conditioned by exposure to AM radio, which is often used as background "noise." (There are no examination questions after listening to rock music for an hour.) You, however, have specific learning goals that you want students to achieve via audiotape. You can help them to achieve those goals by focusing their attention on specific matters.
3. Since you know the needs and interests of your students better than anyone else, feel free to "customize" audiotape by using only those parts of the program that are necessary to your purpose. An easy way to do this is to listen to a tape and **log** important segments by utilizing the **counter** on the machine. Then use the **fast forward** button to reach a desired segment of the program quickly, and the **rewind** button to review an important point.
4. Many school tape players are not equipped with large or powerful loudspeakers. If necessary, let students alter seating arrangements so that all of them can hear the program.
5. Try alternatives to classroom presentation of audio programs. For instance, you could have individual students listen to the tapes in study carrels in the resource centre. Since audiotape is inexpensive and many students have their own cassette players, you might want to obtain a number of copies of an interesting program and give students the option of taking one home.

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